

# Service Manual

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SM-RSM63

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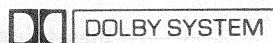
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Cassette Deck

## RS-M63

(Silver Face)  
(Black Face)

3-Head Stereo Cassette Deck with Metal Tape Selector,  
2-Color FL Peak Meters and Memory Auto-Play



This is the Service Manual for the following areas.

- ..... For All European areas except United Kingdom.
- ▢ ..... For United Kingdom.
- ▣ ..... For Asia, Latin America, Middle East and Africa areas.
- ▤ ..... For Australia.

### RS-631 MECHANISM SERIES

#### Specifications

|                        |                                                                                                                                     |                    |                                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------|
| Track system:          | 4-track 2-channel stereo recording and playback                                                                                     | Inputs:            | MIC; sensitivity 0.25 mV, input impedance 10 kΩ<br>applicable microphone impedance 400 Ω — 10 kΩ                      |
| Tape speed:            | 4.8 cm/s                                                                                                                            |                    | LINE; sensitivity 60 mV, input impedance 56 kΩ                                                                        |
| Wow and flutter:       | 0.05% (WRMS), ±0.14% (DIN)                                                                                                          | Outputs:           | LINE; output level 650 mV, output impedance 2.7 kΩ or less, load impedance 22 kΩ over                                 |
| Frequency response:    | Metal tape; 20—20,000 Hz<br>30—18,000 Hz (DIN)<br>30—17,000 Hz ±3 dB<br>(0 VU) 40—13,000 Hz ±3 dB                                   |                    | HEADPHONE; output level 100 mV, load impedance 8 Ω                                                                    |
|                        | CrO <sub>2</sub> /Fe-Cr tape; 20—18,000 Hz<br>30—18,000 Hz (DIN)<br>30—16,000 Hz ±3 dB                                              | Rec/pb connection: | 5 P DIN type; input sensitivity 0.25 mV, impedance 8.2 kΩ, output level 650 mV, impedance 2.8 kΩ                      |
|                        | Normal tape; 20—18,000 Hz<br>30—17,000 Hz (DIN)<br>30—15,000 Hz ±3 dB                                                               | Bias frequency:    | 85 kHz                                                                                                                |
| Signal-to-noise ratio: | Dolby* NR in; 67 dB (above 5 kHz)<br>Dolby NR out; 57 dB<br>(signal level = max. recording level, Fe-Cr/CrO <sub>2</sub> type tape) | Motor:             | Electronically controlled DC motor                                                                                    |
| Fast forward and       |                                                                                                                                     | Heads:             | 3-head system;<br>2-HPF heads for record/playback (combination type)<br>1-sendust/ferrite double-gap head for erasure |
| rewind time:           | Approx. 90 seconds with C-60 cassette tape                                                                                          | Power requirement: | AC; 110/125/220/240 V, 50-60 Hz<br>Power consumption; 14 W                                                            |
|                        |                                                                                                                                     | Dimensions:        | 43.0 cm (W) × 14.2 cm (H) × 27.0 cm (D)                                                                               |
|                        |                                                                                                                                     | Weight:            | 6.3 kg                                                                                                                |

Specifications are subject to change without notice.

\* 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.

# Technics

Matsushita Electric Trading Co., Ltd.  
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# LOCATION OF CONTROLS AND COMPONENTS

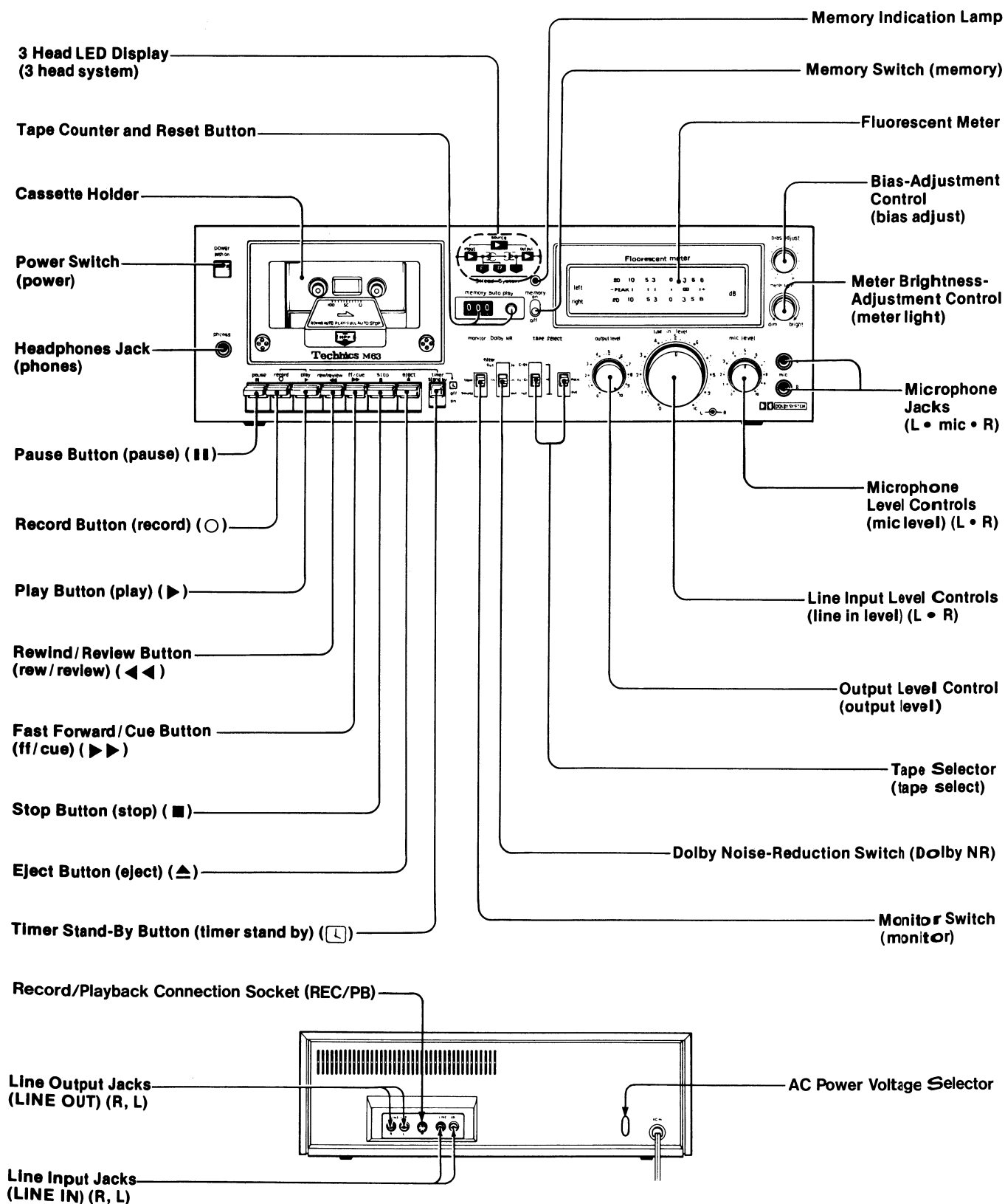


Fig. 1

# RS-M63 FRANCAIS

## MESURES ET REGLAGES

### NOTA:

- Vérifiez que les têtes soient propres.
- Vérifiez que le cabestan et le galet-presse soient propres.
- Température ambiante admissible:  $20 \pm 5^\circ\text{C}$ .
- Sélecteur de Dolby:
- Sélecteur de bande: Normal.
- Commande de réglage de la polarisation: Centre.
- Commande de la luminance du voltmètre: Centre.
- Commutateur de contrôle: Position bande.

| SECTION                                                                                                                                                                                                                                         | MESURES ET REGLAGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <b>A Azimutage de tête</b><br>Condition:<br>* Position lecture<br>Equipement:<br>* Voltmètre électronique<br>* Oscilloscope<br>* Bande étalon (Fenêtre de passage de la bande avec miroir.)<br>...QZZCRD<br>* Bande étalon (Azimutage)...QZZCFM | <b>Réglage de la tête multiple</b><br>1. Branchez les appareils comme ci-dessous. (Fig. 8).<br>2. Lisez la bande étalon (QZZCRD).<br>3. Ces conditions étant remplies, réglez les vis (A) et (B) montrés à la fig. 9 et 11 pour que la bande ne fasse pas de boucle ou ne se déforme par les guides-bandes de la tête d'effacement et de la tête multiple. (la fig. 10 montre la position correcte).<br><b>Nota:</b><br>En ce qui concerne la tête multiple, réglez soigneusement la hauteur de manière à ce que la surface de la tête se mette en contact parallèlement avec la bande comme il est montré à la fig. 11.<br>4. Lisez la bande étalon d'azimutage (QZZCFM, 8kHz).<br>5. Réglez la vis (C) d'orientation fig. 9 de la tête multiple pour obtenir le niveau maximal à la sortie LINE OUT.<br>6. Mesurez les deux canaux, et ajustez les niveaux à égalité de tension de sortie.<br>7. Après réglage, bloquez la vis par une goutte de vernis.                                                                                                                                                                                           |
| <b>B Vitesse de éfilement</b><br>Condition:<br>* Position lecture<br>Equipement:<br>* Compteur électronique numérique ou fréquencemètre numérique<br>* Bande étalon...QZZCWAT                                                                   | <b>Précision de la vitesse de éfilement</b><br>1. Branchez les appareils comme ci-dessous. (Voir fig. 8).<br>2. Lisez la bande étalon (QZZCWAT, 3000Hz) et appliquez le signal de sortie au fréquencemètre.<br>3. Mesurez sa fréquence.<br>4. Sur la base de 3000Hz, déterminez la valeur à l'aide de la formule.<br>$\text{Précision de vitesse} = \left( \frac{f - 3000}{3000} \times 100 \right) \%$ avec f = valeur mesurée.<br>5. Effectuez la mesure sur la partie médiane de la bande.<br><b>Valeur normale: <math>\pm 1,5\%</math></b><br><b>Méthode de réglage</b><br>1. Lisez la bande étalon (milieu).<br>2. Ajustez la vis de réglage de vitesse VR indiquée fig. 29 pour que la fréquence devienne égale à 3000Hz.<br><b>Fluctuations de vitesse de défilement</b><br>Faites les mesures de la même façon que ci-dessus (au début, au milieu et en fin de bande) et déterminez la différence entre les valeurs maximale et minimale, puis calculez comme suit.<br>$\text{Fluctuations de vitesse} = \left( \frac{f_1 - f_2}{3000} \times 100 \right) \%$ $f_1$ = valeur maximal<br>$f_2$ = valeur minimale<br><b>Valeur normale: 1%</b> |

| SECTION                                                                                                                                                                                        | MESURES ET REGLAGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <b>C Réponse en fréquence à la lecture</b><br>Condition:<br>* Position lecture<br>Equipement:<br>* Voltmètre électronique<br>* Oscilloscope<br>* Bande étalon...QZZCFM                         | 1. Branchez les appareils de mesure comme pour "l'azimutage de tête", mais en utilisant la bande étalo (QZZCFM) au lieu de la bande étalon d'azimutage (voir fig. 8).<br>2. Placez l'appareil en position lecture.<br>3. Lisez la bande étalon de courbe de réponse (QZZCFM).<br>4. Mesurez les niveaux de sortie à 10kHz, 8kHz, 4kHz, 1kHz, 315Hz 250Hz, 125Hz et 63Hz comparez chaque niveau de sortie avec celui de la fréquence étalon de 333Hz, sur la borne LINE OUT.<br>5. Effectuez la mesure sur les deux canaux.<br>6. Vérifiez que les valeurs mesurées se situent à l'intérieur du gabarit de courbe de réponse.<br><b>Réglage</b><br>Si les valeurs ne sont pas correctes, réglez VR1 (canal gauche) et VR2 (droit) (voir fig. 29).<br>1. A 4kHz:<br>Si le niveau de sortie à 4kHz n'est pas égale au niveau de sortie à 315Hz, réglez le VR1 (canal gauche) et le VR2 (canal droit).<br>2. Bande de haute fréquence:<br>Si la valeur mesurée n'est pas standard dans une bande de haute fréquence comme montré à la fig. 13, changez les points de soudure comme il est indiqué dans les exemples suivants:<br>a. Quand le niveau de sortie diminue comme indique fig. 14, souder le point de jonction (B) sur la plaquette de circuit imprimé. (Voir fig. 16).<br>b. Quand le niveau de sortie augmente comme indiqué fig. 15, dessouder le point de jonction (A) sur la plaquette de circuit imprimé. (Voir fig. 16). |
| <b>D Gain à la lecture</b><br>Condition:<br>* Position lecture<br>* Commande de niveau de sortie...MAX<br>Equipement:<br>* Voltmètre électronique<br>* Oscilloscope<br>* Bande étalon...QZZCFM | 1. Branchez les appareils selon la fig. 8.<br>2. Lisez la partie "niveau standard" de la bande étalon (QZZCFM, 315Hz) et mesurez le niveau de sortie, avec le voltmètre électronique, sur le jack LINE OUT.<br>3. Effectuez les mesures sur les deux canaux.<br><b>Valeur normale: 0,65V</b><br><b>Réglage</b><br>1. Si la valeur mesurée n'est pas correct, réglez VR3 (canal gauche) et VR4 (droit) (Voir fig. 28).<br>2. Après réglage, vérifiez à nouveau la "réponse en fréquence à la lecture".                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>E Courant d'enregistrement</b><br>Condition:<br>* Position lecture<br>Equipement:<br>* Voltmètre électronique<br>* Oscilloscope<br>* Générateur AF<br>* Atténuateur                         | 1. Branchez les appareils comme ci-dessous (Voir fig. 17).<br>2. Arrêtez les oscillations de polarisation en dessoudant le point de jonction (C) pour le courant de polarisation ON ou OFF comme indiqué fig. 16.<br>3. Alimenter d'un kHz (-24dB) et réglez le ATT de telle façon que le niveau de contrôle à la "LINE OUT" devienne 0,65V.<br>4. Mesurez le voltage et calculez alors le courant d'enregistrement par la formule donnée ci-dessous:<br>$\text{Courant d'enregistrement} = \frac{\text{Tension lue sur voltm. élec (V)}}{10(\Omega)}$ <b>Valeur normale:</b><br>Autour de $230\mu\text{A}$ (position Metal),<br>Autour de $180\mu\text{A}$ (position $\text{CrO}_2$ ),<br>Autour de $150\mu\text{A}$ (position Fe-Cr),<br>Autour de $150\mu\text{A}$ (position Normal)<br>5. Si la valeur mesurée n'est pas correct, réglez les VR suivants:<br>Position Metal ...VR205 (L-CH), VR206 (R-CH)<br>Position $\text{CrO}_2$ ...VR207 (L-CH), VR208 (R-CH)<br>Position Fe-Cr ...VR209 (L-CH), VR210 (R-CH)<br>Position Normal...VR211 (L-CH), VR212 (R-CH)                                                                                                                                                                                                                                                                                                                                                                |

| SECTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | MESURES ET REGLAGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <b>F Fuites de Prémagnétisation</b><br>Condition:<br>* Position enregistrement<br>* Commandes de niveau MIC et LINE IN...MAX<br>Equipement:<br>* Voltmètre électronique<br>* Oscilloscope                                                                                                                                                                                                                                                                                                            | 1. Branchez les appareils comme ci-dessous.<br>2. Placez l'appareil en position enregistrement suivant la formule suivante.<br>$\text{Courant d'effacement (A)} = \frac{\text{Tension aux bornes de la résistance}}{1(\Omega)}$ <b>Valeur normale:</b><br>Plus de $95\text{mA}$ (position Metal)<br>plus de $68\text{mA}$ (position $\text{CrO}_2$ )<br>plus de $55\text{mA}$ (position Fe-Cr)<br>plus de $45\text{mA}$ (position Normal)<br>3. Si la valeur mesurée n'est pas correct, réglez VR401 (canal gauche) et VR402 (canal droit).<br>Position Metal ...VR407<br>Position $\text{CrO}_2$ ...VR406<br>Position Fe-Cr ...VR405<br>Position Normal...VR404 |
| <b>G Courant de prémagnétisation</b><br>Condition:<br>* Position enregistrement<br>* Lorsqu'on règle le courant de prémagnétisation pour un seul canal; le courant de l'autre peut varier.<br>* Commande de réglage de la polarisation: centre<br>Equipement:<br>* Voltmètre électronique<br>* Oscilloscope                                                                                                                                                                                          | 1. Branchez les appareils comme ci-dessous.<br>2. Placez l'appareil en position enregistrement bande sur "normal" (pour bande normale).<br>3. Lisez la tension sur le voltmètre électronique courant de prémagnétisation selon la formule.<br>$\text{Courant de prémagnétisation (A)} = \frac{\text{Tension lue sur voltm.}}{10(\Omega)}$ <b>Valeur normale:</b><br>Autour de $2,2\text{mA}$<br>Autour de $1,6\text{mA}$<br>Autour de $1,3\text{mA}$<br>Autour de $1,1\text{mA}$<br>4. Réglez VR401 canal gauche et VR402 (canal droit).                                                                                                                         |
| <b>H Gain global</b><br>Condition:<br>* Positions enregistrement/lecture<br>* Commande de niveau LINE IN...MAX<br>* Commande de niveau de Sortie...MAX<br>* Niveaux d'entrée normaux MIC -72 $\pm$ 4dB<br>LINE IN -24 $\pm$ 3dB<br>DIN -41 $\pm$ 3dB<br>Equipement:<br>* Générateur AF<br>* Voltmètre électronique<br>* Atténuateur<br>* Oscilloscope<br>* Bande étalon vierge ...QZZCRA pour type de bande normale<br>...QZZCRX pour $\text{CrO}_2$<br>...QZZCRY pour Fe-Cr<br>...QZZCRZ pour Metal | 1. Branchez les appareils comme sur la fig. 17.<br>2. Appliquez un signal à 1kHz (-24dB) du générateur vers l'atténuateur, à l'entrée LINE IN.<br>3. Réglez l'atténuateur pour que le niveau sur LINE OUT soit de 0,65V.<br>4. Faites un enregistrement avec la bande.<br>5. Lisez la bande ainsi enregistrée, et vérifiez le niveau sur le voltmètre électronique branché sur la sortie LINE OUT de 0,65V.<br>6. Si la valeur mesurée n'est pas correct, réglez VR205 (L-CH), VR206 (R-CH), VR207 (L-CH), VR208 (R-CH), VR209 (L-CH), VR210 (R-CH), VR211 (L-CH), VR212 (R-CH).<br>7. Recommencez à partir du palier (2).                                       |

| MESURES ET REGLAGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| <ol style="list-style-type: none"> <li>1. Branchez les appareils comme ci-dessous (voir fig. 18).</li> <li>2. Placez l'appareil en position enregistrement.</li> <li>3. Réglez les bobines de la trappe L207 (canal gauche) et L208 (droit) pour que la mesure soit au minimum.</li> <li>4. Effectuez ce réglage pour les deux canaux.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ol style="list-style-type: none"> <li>1. Branchez les appareils comme ci-dessous (voir fig. 19).</li> <li>2. Lire le voltage sur le VTVM et déterminer la tension d'effacement suivant la formule suivante.<br/> <div> <div>Courant d'effacement (A) =</div> <div> <div>Tension aux bornes de la résistance 1Ω (V)</div> <div>1(Ω)</div> </div> </div> <div> <div>Plus de 95mA (position Metal)</div> <div>plus de 68mA (position CrO<sub>2</sub>)</div> <div>plus de 55mA (position Fe-Cr)</div> <div>plus de 45mA (position Normal)</div> </div> </li> <li>3. Si la valeur mesurée n'est pas correct, réglez les VR suivants:<br/>           Position Metal ...VR407<br/>           Position CrO<sub>2</sub> .....VR406<br/>           Position Fe-Cr ...VR405<br/>           Position Normal...VR404</li> </ol>                                                                                                       |
| <ol style="list-style-type: none"> <li>1. Branchez les appareils comme ci-dessous (voir fig. 20).</li> <li>2. Placez l'appareil en position enregistrement, le sélecteur de bande sur "normal" (pour bande normale).</li> <li>3. Lisez la tension sur le voltmètre électronique et calculez le courant de prémagnétisation selon la formule.<br/> <div> <div>Courant de prémagnétisation (A) =</div> <div> <div>Tension lue sur voltm. élec. (V)</div> <div>10(Ω)</div> </div> </div> <div> <div>Autour de 2,2mA (position Metal)</div> <div>Autour de 1,6mA (position CrO<sub>2</sub>)</div> <div>Autour de 1,3mA (position Fe-Cr)</div> <div>Autour de 1,1mA (position Normale)</div> </div> </li> <li>4. Réglez VR401 canal gauche et VR402 (canal droit).</li> </ol>                                                                                                                                                  |
| <ol style="list-style-type: none"> <li>1. Branchez les appareils comme sur la fig. 21.</li> <li>2. Appliquez un signal à 1 kHz (−24dB) du générateur AF, à travers l'atténuateur, à l'entrée LINE IN.</li> <li>3. Réglez l'atténuateur pour que le niveau d'écoute simultanée sur LINE OUT soit de 0,65V.</li> <li>4. Faites un enregistrement avec la bande étalon.</li> <li>5. Lisez la bande ainsi enregistrée, et vérifiez que la valeur lue sur le voltmètre électronique branché sur LINE OUT est bien de 0,65V.</li> <li>6. Si la valeur mesurée n'est pas correct, réglez les VR suivants:<br/>           Position Metal ...VR205 (L-CH), VR206 (R-CH)<br/>           Position CrO<sub>2</sub> .....VR207 (L-CH), VR208 (R-CH)<br/>           Position Fe-Cr ...VR209 (L-CH), VR210 (R-CH)<br/>           Position Normal...VR211 (L-CH), VR212 (R-CH)</li> <li>7. Recommencez à partir du palier (2).</li> </ol> |

| SECTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | MESURES ET REGLAGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <p>🔊 <b>Indicateur de niveau</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Position enregistrement</li> <li>* Commande de niveau ...MAX</li> <li>* Commande de niveau de sortie...MAX</li> <li>* Selecteur de band ...position basse</li> </ul> <p>Equipement:</p> <ul style="list-style-type: none"> <li>* Voltmètre électronique</li> <li>* Oscilloscope</li> <li>* Générateur AF</li> <li>* Atténuateur</li> <li>* Commutateur de contrôle ...Position Source</li> </ul>                                 | <ol style="list-style-type: none"> <li>1. Branchez les appareils comme sur la fig. 21.</li> <li>2. Placez sélecteur Brightness sur "BRIGHT" position.</li> <li>3. Alimenter d'un KHz (−24dB) a la fiche "LINE IN", puis pousser le bouton d'enregistrement.</li> <li>4. Régler le ATT de telle façon à ce que le niveau de sortie à la fiche "LINE OUT" devienne 0,65V (= niveau de sortie standard).</li> <li>5. Réglage au "0dB".           <ol style="list-style-type: none"> <li>A. Régler VR103 (L-CH) et VR104 (R-CH) de telle manière à ce que le compteur métrique fluorescent marque une indication lumineuse jusqu'à "0dB" lorsque le niveau d'entrée est de 0,9dB plus haut que le niveau d'entrée standard.</li> <li>B. S'assurer ensuite que le compteur métrique marque une indication lumineuse jusqu'à " + 1 dB" lorsque le signal du niveau d'entrée est plus haut de 1,0dB que le niveau d'entrée standard.</li> </ol> </li> <li>6. Réglage au "−20dB".           <ol style="list-style-type: none"> <li>A. Régler VR101 (L-CH) et VR102 (R-CH) de telle façon à ce que le compteur fluorescent marque une indication lumineuse jusqu'à "−20dB" lorsque le signal du niveau d'entrée est de 15,1dB plus bas que le niveau d'entrée standard.</li> <li>B. S'assurer ensuite que le compteur fluorescent marque une indication lumineuse jusqu'à"−15dB" lorque le signal du niveau d'entrée est de 15,0dB plus bas que le niveau d'entrée standard.</li> </ol> </li> </ol>                                                   |
| <p>📈 <b>Courbe de réponse globale</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Positions enregistrement/lecture</li> <li>* Commande de niveau ...MAX</li> <li>* Commande de niveau de sortie...MAX</li> </ul> <p>Equipement:</p> <ul style="list-style-type: none"> <li>* Voltmètre électronique</li> <li>* Générateur AF</li> <li>* Atténuateur</li> <li>* Bande étalon vierge ...QZZCRA pour type normal<br/>...QZZCRX pour CrO<sub>2</sub><br/>...QZZCRY pour Fe-Cr<br/>...QZZCRZ pour Metal</li> </ul> | <p><b>Nota:</b></p> <p>Avant de mesurer et régler, vérifiez que la courbe de réponse en lecture est correct (pour la méthode de mesure, reportez-vous au paragraph considéré).</p> <ol style="list-style-type: none"> <li>1. Branchez les appareils de mesure comme surla fig. 21.</li> <li>2. Mettez la bande vierge étalon en place et placez l'appareil en position enregistrement.</li> <li>3. Appliquez un signal à 1kHz du générateur AF, à travers l'atténuateur, à l'entrée LINE IN.</li> <li>4. Réglez l'atténuateur pour que le niveau d'entrée soit inférieur de −20dB au niveau étalon d'enregistrement (qui est égal à 0VU).</li> <li>5. A ce moment, le niveau sur LINE OUT est de 0,065V.</li> <li>6. Enregistrez les fréquences de 50Hz, 100Hz, 200Hz, 1 kHz, 2kHz, 4kHz, 8kHz, 10kHz et 13kHz (15kHz pour bande Metal/ bande CrO<sub>2</sub>/bande FeCr) à niveau constant.</li> <li>7. Lisez cet enregistrement et exprimez en dB les différences entre le niveau de sortie de chaque fréquence et le niveau à 1 kHz.</li> <li>8. Vérifiez que les valeurs mesurées s'inscrivent bien à l'intérieur du gabarit de courbe de réponse global.</li> <li>9. Mettre le sélecteur de polarisation et de compensation en position Metal, CrO<sub>2</sub> et Fe-Cr.</li> <li>10. Effectuez les mesures comme ci-dessus.</li> <li>11. Vérifiez que les valeurs mesurées s'inscrivent bien à l'intérieur du gabarit de courbe de réponse globale avec bande au Metal, CrO<sub>2</sub> et Fe-Cr ci-dessous (voir fig. 25).</li> </ol> |
| <p>📈 <b>Courbe de réponse globale</b></p> <p>(méthode normale de réglage)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <ol style="list-style-type: none"> <li>1. Lorsque la courbe de réponse dépasse le gabarit entre le médium et l'aigu, comme indiqué par le trait plein de la fig. 26, augmentez le courant de prémagnétisation en tournant les VR suivants.<br/>           Position Metal...VR407, Position CrO<sub>2</sub> .....VR406, Position Fe-Cr...VR405, Position Normal...VR404.</li> <li>2. Lorsqu'elle est inférieure, comme indiqué par la ligne en trait interrompu, réduisez le courant de prémagnétisation en tournant les VR suivants en sens inverse.<br/>           Position Metal...VR407, Position CrO<sub>2</sub> .....VR406, Position Fe-Cr...VR405, Position Normal...VR404.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| SECTION                                                                                                                                                                                                                                                                                                                                      | MESURES ET REGLAGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|                                                                                                                                                                                                                                                                                                                                              | <p><b>Nota:</b></p> <ol style="list-style-type: none"> <li>1. Pour les réglages avec un courant de prémagnétisation inférieur à la valeur normale de 0,17mA, utilisez la seconde méthode, car une réduction du courant de prémagnétisation au-dessous de cette valeur risque de détériorer le taux de distortion.</li> <li>2. Pour la mesure du courant de prémagnétisation, reportez-vous au paragraphe correspondant.</li> </ol> <p style="text-align: center;"><b>Réglage 2—Utilisation des bobines de corection d'enregistrement</b></p> <ol style="list-style-type: none"> <li>1. Lorsque la courbe de réponse est plate dans le médium et croît ou chute fortement dans l'aigu, comme indiqué par la Fig. 27, réglez en tournant les bobines suivants de correction d'enregistrement avec les bandes normales.<br/>           Position Metal<br/>           Position CrO<sub>2</sub> .....L205 (L-CH), L206 (R-CH)<br/>           Position Fe-Cr<br/>           Position Normal.....L203 (L-CH), L204 (R-CH)</li> </ol> |
| <p>🔊 <b>Circuit Dolby</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Positio enregistrement</li> <li>* Commande de niveau LINE IN...MAX</li> </ul> <p>Equipement:</p> <ul style="list-style-type: none"> <li>* Voltmètre électronique</li> <li>* Générateur AF</li> <li>* Atténuateur</li> <li>* Oscilloscope</li> </ul> | <ol style="list-style-type: none"> <li>1. Placez l'appareil en position enregistrement et le sélecteur Dolby en position OUT, puis appliquez un signal à 5kHz à l'entrée LINE IN pour obtenir −35 dB sur TP5 (canal gauche) et TP6 (droit).</li> <li>2. Vérifiez que la valeur en position IN du sélecteur Dolby augmente de 8 (±1) dB par rapport à celle obtenue en position OUT.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



# RS-M63 DEUTSCH

## Messungen und Einstellung

### Anm.:

1. Für saubere Köpfe sorgen.
2. Für saubere Tonwelle und Andruckrolle sorgen.
3. Auf normale Raumtemperatur achten:  $20 \pm 5^\circ \text{C}$ .
4. Dolby-Schalter: Aus.
5. Band Schalter: Normal.
6. Vormagnetisierungsregler: Zentrum.
7. Meterhelligkeits-Regler: Zentrum.
8. Monitorschalter: Band-Position.

| Gegenstand                                                                                                                                                                                                                               | Messung und Einstellung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| <b>A Senkrechtstellen des Kopfes</b><br><br>Bedingung:<br>* Wiedergabe<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* Oszillograf<br>* Testband (azimuth) ...QZZCFM<br>* Testband (Bandlaufweg-Betrachtungsvorrichtung mit Spiegel)...QZZCRD | <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 8.</li> <li>2. Testband (QZZCRD) wiedergeben.</li> <li>3. In diesem Zustand die Schrauben (A) und (B) in Fig. 9 und 11 so einstellen, daß das Band nicht gekräuselt oder durch die Bandführungen des Löschkopfes und des Kombinationskopfes verformt werden kann. (Fig. 10 zeigt den korrekten Zustand.)</li> <li>4. Testband (QZZCFM, 8kHz) wiedergeben.</li> <li>5. Einstellschraube (C) (Fig. 8) auf maximale Ausgangsspannung einstellen.</li> <li>6. Beide Kanäle überprüfen und auf gleiche Ausgangsspannung einstellen.</li> <li>7. Nach dem Abgleich Einstellschraube mit Lack sichern.</li> </ol> <p><b>Anm.:</b><br/>Die Höhe des Löschkopfes sorgfältig abgleichen, daß die Kopfoberfläche das Band parallel berührt, wie in Fig. 11 gezeigt.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>B Bandgeschwindigkeit</b><br><br>Bedingung:<br>* Wiedergabe<br><br>Meßgerät:<br>* Elektronischer Digitalzähler<br>* Testband...QZZCWAT                                                                                                | <p><b>Genauigkeit der Bandgeschwindigkeit</b></p> <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 12.</li> <li>2. Testband (QZZCWAT 3000Hz) wiedergeben und Ausgangssignal dem Zähler zuführen.</li> <li>3. Frequenz messen.</li> <li>4. Beträgt die auf dem Testband aufgezeichnete Frequenz 3000Hz, so ergibt sich die Genauigkeit nach folgender Formel:<br/> <math display="block">\text{Genauigkeit der Bandgeschwindigkeit} = \frac{f - 3000}{3000} \times 100(\%)</math>                     worin f die gemessene Frequenz ist.</li> <li>5. Die Messung soll im mittleren Teil des Bandes erfolgen.</li> </ol> <p><b>NORMALWERT: <math>\pm 1,5\%</math></b></p> <p><b>Einstellung:</b></p> <ol style="list-style-type: none"> <li>1. Den mittleren Teil des Testbandes wiedergeben.</li> <li>2. Die Einstellschraube VR (Fig. 29) so verstellen, daß eine Frequenz von 3000Hz angezeigt wird.</li> </ol> <p><b>Schwankung der Bandgeschwindigkeit:</b><br/>Messung, wie oben beschrieben, für Anfang, mittleren Teil und Ende des Testbandes wiederholen und Schwankung wie folgt bestimmen:</p> $\text{Schwankung} = \frac{f_1 - f_2}{3000} \times 100(\%)$ <p><math>f_1</math> = Maximalwert<br/><math>f_2</math> = Minimalwert</p> <p><b>NORMALWERT: 1%</b></p> |

| Gegenstand                                                                                                                                           | Messung und Einstellung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| <b>C Frequenzgang bei Wiedergabe</b><br><br>Bedingung:<br>* Wiedergabe<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* Oszillograf<br>* Testband...QZZCFM | <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 8, jedoch ist jetzt das Testband QZZCFM zu verwenden.</li> <li>2. Gerät auf "Wiedergabe" schalten.</li> <li>3. Frequenzgang-Testband QZZCFM wiedergeben.</li> <li>4. Ausgangsspannungen bei 10kHz, 8kHz, 4kHz, 1kHz, 315Hz, 250Hz, 125Hz und 63Hz mit Ausgangsspannung der Standard-Frequenz 315Hz vergleichen.</li> <li>5. Messungen an beiden Kanälen durchführen.</li> <li>6. Prüfen, ob die Werte innerhalb der in Fig. 13 dargestellten Kurven liegen.</li> </ol> <p><b>Einstellung:</b></p> <ol style="list-style-type: none"> <li>1. Bei 4kHz:<br/>Falls der gemessene Ausgangspegel bei 4kHz nicht dem Ausgangspegel bei 315Hz entspricht, VR1 (Linker Kanal) und VR2 (rechter Kanal) abgleichen.</li> <li>2. Bei Hochfrequenzbereich:<br/>Falls der gemessene Wert beim Hochfrequenzbereich nicht innerhalb des Richtwertes liegt (in Fig. 13 gezeigt), die Lötstelle gemäß folgenden Beispielen ändern.<br/>                     a. Wenn der Ausgangspegel reduziert wird, wie in Fig. 14 gezeigt, die Anschlußstelle (B) auf der gedruckten Schaltung löten. (Voir fig. 16)<br/>                     b. Wenn der Ausgangspegel gesteigert wird, wie in Fig. 15 gezeigt, die Anschlußstelle (A) auf der gedruckten Schaltung lötlöten. (Voir fig. 16)</li> </ol> |
| <b>D Wiedergabe-Verstärkung</b><br><br>Bedingung:<br>* Wiedergabe<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* Oszillograf<br>* Testband...QZZCFM      | <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 8.</li> <li>2. Standard-Frequenz (315Hz) vom Testband wiedergeben und Ausgangsspannung messen.</li> <li>3. Messung an beiden Kanälen durchführen.</li> </ol> <p><b>NORMALWERT: 0,65V</b></p> <p><b>Einstellung:</b></p> <ol style="list-style-type: none"> <li>1. Abweichungen können durch Abgleich von VR3 (linker Kanal) und VR4 (rechter Kanal) (S. Fig. 28) korrigiert werden.</li> <li>2. Nach erfolgtem Abgleich ist der Frequenzgang bei Wiedergabe erneut zu kontrollieren.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>E Aufnahmestrom</b><br><br>Bedingung:<br>* Aufnahme<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* NF-Generator<br>* Abschwächer                      | <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 17</li> <li>2. Vormagnetisierung durch Lötlöten der Anschlußstelle (C) für Vormagnetisierungsstrom ON oder OFF in Fig. 16.</li> <li>3. 1kHz-Signal (-24dB) zuführen und ATT abgleichen, bis Monitorpegel an LINE OUT 0,65V ist.</li> <li>4. Spannung messen und dann Aufnahmestrom nach folgender Formel berechnen.<br/> <math display="block">\text{Aufnahmestrom} = \frac{\text{Spannung am Röhrenvoltmeter (V)}}{10 \text{ (Ohm)}}</math></li> </ol> <p><b>NORMALWERT:</b><br/>                     Ungefähr 230µA (Metal position)<br/>                     Ungefähr 180µA (CrO<sub>2</sub> position)<br/>                     Ungefähr 150µA (Fe-Cr position)<br/>                     Ungefähr 150µA (Normal position)</p> <ol style="list-style-type: none"> <li>5. Falls der gemessene Wert nicht der Toleranz liegt, die folgenden VR abgleichen.<br/>                     Metal position ...VR205 (L-CH), VR206 (R-CH)<br/>                     CrO<sub>2</sub> position .....VR207 (L-CH), VR208 (R-CH)<br/>                     Fe-Cr position ...VR209 (L-CH), VR210 (R-CH)<br/>                     Normal position...VR211 (L-CH), VR212 (R-CH)</li> </ol>                                                                                                  |

| Gegenstand                                                                                                                                                                                                                                                                                                                                                                                                                                       | Messung und                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <b>F Störstrahlung der Vormagnetisierung</b><br><br>Bedingung:<br>* Aufnahme<br><br>Meßgerät:<br>* Elektronisches Voltmeter<br>* Oszilloskop                                                                                                                                                                                                                                                                                                     | <ol style="list-style-type: none"> <li>1. Die Verbindungen des Prüfaufbaus gegeben.</li> <li>2. Gerät auf Aufnahme schalten.</li> <li>3. Sperrkreisspulen L207 (L-CH, Linker Kanal) so abgleichen, daß die Werte innerhalb der in Fig. 13 dargestellten Kurven liegen.</li> <li>4. Beide Kanäle abgleichen.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>G Löschstrom</b><br><br>Bedingung:<br>* Aufnahme<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* Oszillograf                                                                                                                                                                                                                                                                                                                                       | <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 19</li> <li>2. Spannung am Röhrenvoltmeter maß folgender Formel berechnen.<br/> <math display="block">\text{Löschstrom (A)} = \frac{\text{Spannung über dem Röhrenvoltmeter}}{10 \text{ (Ohm)}}</math></li> <li>3. Falls der gemessene Wert nicht dem VR abgleichen.<br/>                     Metal position...VR407, CrO<sub>2</sub> position...VR408, Fe-Cr position...VR405, Normal position...VR406</li> </ol> <p><b>NORMALWERT:</b><br/>                     Größer<br/>                     Größer<br/>                     Größer</p>                                                                                                                                                |
| <b>H Vormagnetisierung</b><br><br>* Bedingung:<br>* Vormagnetisierungsregler: Zentrum<br>* Aufnahme<br>* Wenn die Vormagnetisierung eines Kanals eingestellt ist, kann die des anderen durchaus abweichend sein.<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* Oszillograf                                                                                                                                                                          | <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 20.</li> <li>2. Gerät auf "Aufnahme" und Band schalten.</li> <li>3. Spannung vom Röhrenvoltmeter nach folgender Formel berechnen.<br/> <math display="block">\text{Vormagnetisierungsstrom (A)} = \frac{\text{Spannung am Röhrenvoltmeter}}{10 \text{ (Ohm)}}</math></li> <li>4. VR401 (linker Kanal) und VR402 (rechter Kanal) (Fig. 28).</li> </ol> <p><b>NORMALWERT:</b><br/>                     Ungef.<br/>                     Ungef.<br/>                     Ungef.</p>                                                                                                                                                                                                             |
| <b>I Gesamt-Verstärkung</b><br><br>Bedingung:<br>* Aufnahme und Wiedergabe<br>* NF-Eingangsregler...Max.<br>* Eingangswahlschalter ...NF-Eingang<br>* Standard-Eingangsspergel Mikrofon -72±4dB<br>NF-Eingang -24±3dB<br>DIN -41±3dB<br><br>Meßgerät:<br>* NF-Generator<br>* Röhrenvoltmeter<br>* Abschwächer<br>* Oszillograf<br>* Testband (Leerband) QZZCRA für Normal<br>QZZCRX für CrO <sub>2</sub><br>QZZCRY für Fe-Cr<br>QZZCRZ für Metal | <ol style="list-style-type: none"> <li>1. Den Meßaufbau zeigt Fig. 21.</li> <li>2. Über den Abschwächer 1kHz auf dem NF-Eingang zuführen.</li> <li>3. Den Abschwächer so einstellen, daß das Signal auf dem Testband auftritt.</li> <li>4. Dieses Signal auf Testband aufnehmen.</li> <li>5. Diese Aufnahme wiedergeben und auf 0,65V stehen.</li> <li>6. Falls der gemessene Wert nicht dem VR abgleichen.<br/>                     Metal position ...VR205 (L-CH), VR206 (R-CH)<br/>                     CrO<sub>2</sub> position .....VR207 (L-CH), VR208 (R-CH)<br/>                     Fe-Cr position ...VR209 (L-CH), VR210 (R-CH)<br/>                     Normal position...VR211 (L-CH), VR212 (R-CH)</li> <li>7. Ab Punkt 2 wiederholen.</li> </ol> |

|  | Messung und Einstellung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|  | <ol style="list-style-type: none"> <li>Die Verbindungen des Prüfaufbaus sind nachstehend Wieder gegeben.</li> <li>Gerät auf Aufnahme schalten.</li> <li>Sperrkreisspulen L207 (L-CH, Linker Kanal) und L208 (R-CH, rechter kanal) so abgleichen, daß der Meßwert minimal wird.</li> <li>Beide kanäle abgleichen.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                 |
|  | <ol style="list-style-type: none"> <li>Den Meßaufbau zeigt Fig. 19</li> <li>Spannung am Röhrenvoltmeter ablesen und Löschstrom gemäß folgender Formel berechnen.<br/> <math display="block">\text{Löschstrom (A)} = \frac{\text{Spannung über dem Widerstand (V)}}{1 \text{ (Ohm)}}</math> <div> Größer als 95mA (Metal position)<br/> Größer als 68mA (CrO<sub>2</sub> position)<br/> Größer als 55mA (Fe-Cr position)<br/> Größer als 45mA (Normal position) </div> </li> <li>Falls der gemessene Wert nicht der Toleranz liegt, die folgenden VR abgleichen.<br/> Metal position...VR407, CrO<sub>2</sub> position .....VR406,<br/> Fe-Cr position...VR405, Normal position...VR404.</li> </ol>                          |
|  | <ol style="list-style-type: none"> <li>Den Meßaufbau zeigt Fig. 20.</li> <li>Gerät auf "Aufnahme" und Bandwahlschalter auf "Normal" schalten.</li> <li>Spannung vom Röhrenvoltmeter ablesen und Vormagnetisierungsstrom nach folgender Formel berechnen:<br/> <math display="block">\text{Vormagnetisierungsstrom (A)} = \frac{\text{Spannung am Röhrenvoltmeter (V)}}{10 \text{ (Ohm)}}</math> <div> Ungefähr 2.2mA (Metal position),<br/> Ungefähr 1.6mA (CrO<sub>2</sub> position),<br/> Ungefähr 1.3mA (Fe-Cr position),<br/> Ungefähr 1.1mA (Normal position). </div> </li> <li>VR401 (linker Kanal) und VR402 (rechter Kanal) abgleichen (S. Fig. 28).</li> </ol>                                                     |
|  | <ol style="list-style-type: none"> <li>Den Meßaufbau zeigt Fig. 21.</li> <li>Über den Abschwächer 1kHz aus dem NF-Generator (-24dB) dem NF-Eingang zuführen.</li> <li>Den Abschwächer so einstellen, daß am NF-Ausgang 0,65V stehen.</li> <li>Dieses Signal auf Testband aufnehmen.</li> <li>Diese Aufnahme wiedergeben und prüfen, ob am NF-Ausgang 0,65V stehen.</li> <li>Falls der gemessene Wert nicht der Toleranz liegt, die folgenden VR abgleichen.<br/> Metal position ...VR205 (L-CH), VR206 (R-CH)<br/> CrO<sub>2</sub> position .....VR207 (L-CH), VR208 (R-CH)<br/> Fe-Cr position ...VR209 (L-CH), VR210 (R-CH)<br/> Normal position...VR211 (L-CH), VR212 (R-CH)</li> <li>Ab Punkt 2 wiederholen.</li> </ol> |

| Gegenstand                                                                                                                                                                                                                                                                                                                 | Messung und Einstellung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <b>Ⓢ Fluoreszenzmeter</b><br>Bedingung<br>* Aufnahme<br>* Eingangsregler...Max.<br>* Bandwahlschalter ...Normalstellung<br>* Ausgangsregler...Max.<br>* Monitorschalter ...Source-Position<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* Oszillograf<br>* NF-Generator<br>* Abschwächer                                       | <ol style="list-style-type: none"> <li>Den Meßaufbau zeigt Fig. 21.</li> <li>Signal vor 1kHz (-24dB) an die Line IN-Buchse eingeben und die Aufnahmetaste drücken.</li> <li>ATT so abstimmen, daß der Ausgangspegel an der LINE OUT-Buchse 0,65V wird.</li> <li>Justierung auf "0dB".<br/> A. VR103 (L-CH) und VR104 (R-CH) so abstimmen, daß die Fluoreszenzmeter eine beleuchtete Anzeige bis "0dB" anzeigen, wenn der Eingangssignalpegel 0,9dB über dem Standard-Eingangspegel liegt.<br/> B. Anschließend überprüfen, daß die Fluoreszenzmeter eine beleuchtete Anzeige bis "+ 1dB" anzeigen, wenn der Eingangssignalpegel 1,0dB über dem Standard-Eingangspegel liegt.</li> <li>Justierung auf "-20dB".<br/> A. VR101 (L-CH) und VR102 (R-CH) so abstimmen, daß die Fluoreszenzmeter eine Leuchtanzeige bis "-20dB" anzeigen, wenn der Eingangssignalpegel 15,1dB unter dem Standard-Eingangspegel liegt.<br/> B. Anschließend überprüfen, daß die Fluoreszenzmeter eine beleuchtete Anzeige bis "-15dB" anzeigen, wenn der Eingangssignalpegel 15,0dB unter dem Standard-Eingangspegel liegt.</li> </ol>                                                                                                                                                                  |
| <b>Ⓚ Gesamt-frequenzgang</b><br>Bedingung:<br>* Aufnahme und Wiedergabe<br>* Eingangsregler...Max.<br>* Ausgangsregler...Max.<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* NF-Generator<br>* Abschwächer<br>* Testband (Leerband)<br>QZZCRA für Normal<br>QZZCRX für CrO <sub>2</sub><br>QZZCRY für FeCr<br>QZZCRZ für Metal | <b>Anm.:</b><br>Vor Messung und Abgleich des Gesamtfrequenzganges ist sicherzustellen, daß der Frequenzgang bei Wiedergabe korrekt ist (Vgl. entspr. Abschnitt). <ol style="list-style-type: none"> <li>Den Meßaufbau zeigt Fig. 21.</li> <li>Testband einlegen.</li> <li>1kHz vom NF-Generator über den Abschwächer dem NF-Eingang zuführen.</li> <li>Den Abschwächer so einstellen, daß der Eingangspegel -20dB des Stand-Aufnahmepegels beträgt (Standard-Aufnahmepegel = Anzeige "0" des Pegel-Meters).</li> <li>Zu diesem Zeitpunkt beträgt der Ausgangspegel 0,065V.</li> <li>Bei dem gleichen Pegel sind die Frequenzen 50Hz, 100Hz, 200Hz, 1kHz, 4kHz, 8kHz, 10kHz und 13kHz (15kHz für Metal band CrO<sub>2</sub> band oder FeCr band) aufzunehmen.</li> <li>Diese Aufnahme wiedergeben und dabei die Abweichungen der Pegel der einzelnen Frequenzen vom 1kHz-Pegel in dB bestimmen.</li> <li>Prüfen, ob die Abweichungen innerhalb der in Fig. 24 angegebenen Toleranzen liegen.</li> <li>Den Vormagnetisierungs- und den Entzerrungs-Wahlschalter in die Metal, CrO<sub>2</sub> und Fe-Cr position stellen.</li> <li>Die gleichen Messungen durchführen.</li> <li>Sicherstellen, daß alle Meßwerte innerhalb der in Fig. 25 dargestellten Grenzen liegen.</li> </ol> |
| <b>Ⓛ Gesamt-Frequenzgang</b><br>(Als Grundlage für den Abgleich)                                                                                                                                                                                                                                                           | <ol style="list-style-type: none"> <li>Werden die mittleren und hohen Frequenzen gemäß der durchgezogenen Linie in Fig. 26 zu stark wiedergegeben, so ist der Vormagnetisierungsstrom durch Drehen, die folgenden VR zu erhöhen.<br/> Metal position...VR407, CrO<sub>2</sub> position .....VR406,<br/> Fe-Cr position...VR405, Normal position...VR404<br/> Kanal und VR16 (rechter Kanal) zu erhöhen.</li> <li>Erfolgt ein Abfall, wie ihn die Strichlinie in Fig. 26 zeigt, so ist an diesen Reglern entgegen der Pfeilrichtung zu drehen, die folgenden VR zu erhöhen.<br/> Metal position...VR407, CrO<sub>2</sub> position ...VR406,<br/> Fe-Cr position...VR405, Normal position...VR404</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Gegenstand                                                                                                                                                                    | Messung und Einstellung                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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|                                                                                                                                                                               | <b>Anm.:</b><br><ol style="list-style-type: none"> <li>Müßte der Vormagnetisierungsstrom unter 0,17mA eingestellt werden, um den geforderten Frequenzgang zu erreichen, so ist nach Anweisung 2 zu verfahren, weil zu geringer Vormagnetisierungsstrom den Klirrfaktor verschlechtert.</li> <li>Für die Messung des Vormagnetisierungsstromes sei auf den Abschnitt "Vormagnetisierung" hingewiesen.</li> </ol><br><b>Abgleich 2-Aufnahme-Entzerrerspule</b><br><ol style="list-style-type: none"> <li>Verläuft der Frequenzgang bei mittleren Frequenzen flach und zeigt bei höheren Frequenzen einen scharfen Anstieg oder Abfall entsprechend Fig. 27 die folgenden Korrekturspulen zu erhöhen.<br/> Metal position<br/> CrO<sub>2</sub> position .....L205 (L-CH), L206 (R-CH)<br/> Fe-Cr position<br/> Normal position.....L203 (L-CH), L204 (R-CH)</li> </ol> |
| <b>Ⓜ Dolby-Schaltung</b><br><br>Bedingung:<br>* Aufnahme<br>* Eingangsregler...Max.<br><br>Meßgerät:<br>* Röhrenvoltmeter<br>* NF-Generator<br>* Abschwächer<br>* Oszillograf | <ol style="list-style-type: none"> <li>Gerät in Stellung "Aufnahme" betreiben und Dolby-Schalter ausschalten. Dem NF-eingang ein 5kHz-Signal zuführen, daß an TP5 (linker Kanal) und TP6 (rechter Kanal) -35dB erhalten werden.</li> <li>Prüfen, ob das Signal bei eingeschaltetem Dolby-Schalter um 8 (±1) dB größer ist als bei ausgeschaltetem Dolby-Schalter.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

DISASSEMBLY INSTRUCTIONS

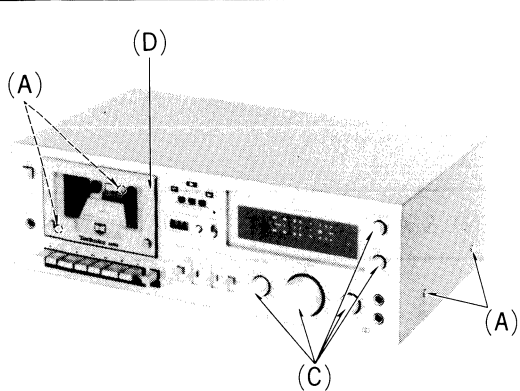


Fig. 2

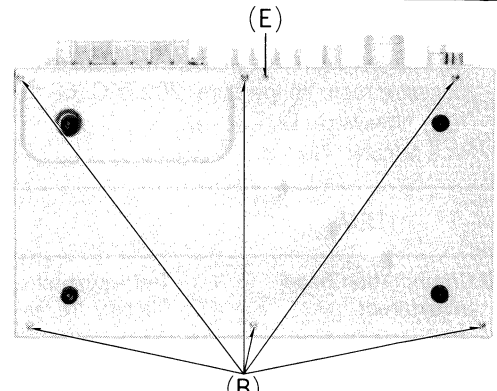


Fig. 3

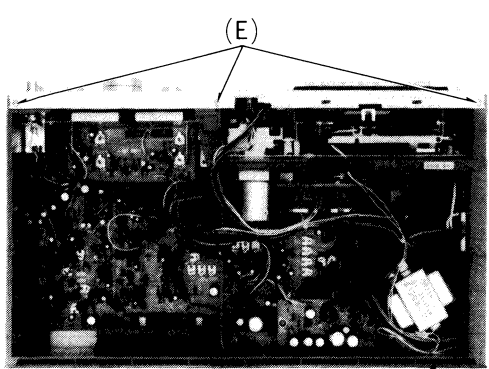


Fig. 4

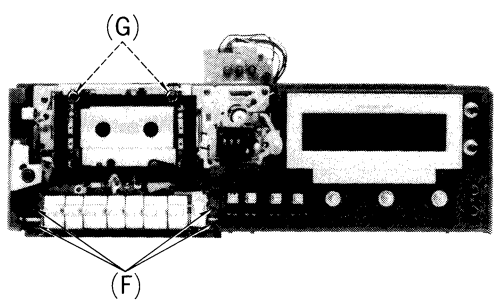


Fig. 5

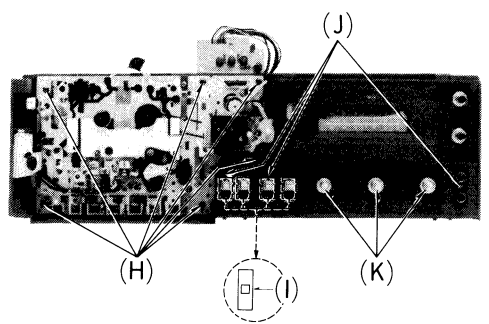


Fig. 6

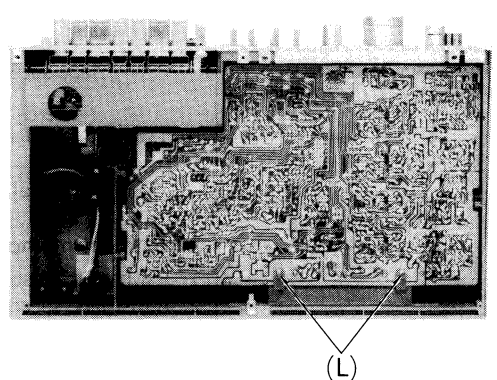


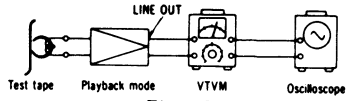
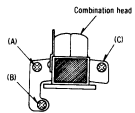
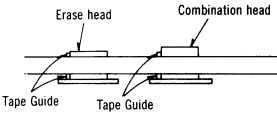
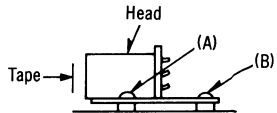
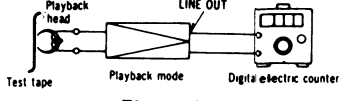
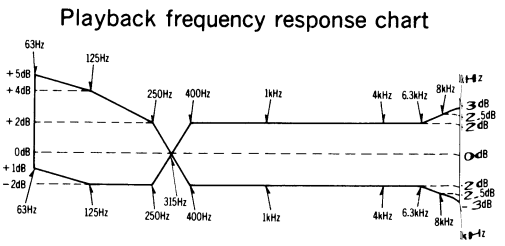
Fig. 7

| Procedure | To remove — .                               | Remove — .                                                                           | Shown in fig. — . |
|-----------|---------------------------------------------|--------------------------------------------------------------------------------------|-------------------|
| 1         | Case cover                                  | • 4 screws.....(A)                                                                   | 2                 |
| 2         | Bottom cover                                | • 6 red screws.....(B)                                                               | 3                 |
| 3         | Front panel                                 | • 5 control knobs.....(C)<br>• Cassette lid .....(D)<br>• 4 screws.....(E)           | 2<br>2<br>3, 4    |
| 4         | Control button assembly and cassette holder | • 4 screws.....(F)<br>• 2 screws.....(G)                                             | 5<br>5            |
| 5         | Mechanism                                   | • 6 red screws.....(H)                                                               | 6                 |
| 5         | Main circuit board                          | • 4 spacers .....(I)<br>• 3 screws.....(J)<br>• 3 nuts.....(K)<br>• 2 screws.....(L) | 6<br>6<br>6<br>7  |

# MEASUREMENT AND ADJUSTMENT METHODS

## NOTE:

1. Make sure heads are clean.
2. Make sure capstan and pressure roller are clean.
3. Judgeable room temperature:  $20 \pm 5^\circ\text{C}$  ( $68 \pm 9^\circ\text{F}$ ).
4. Dolby NR switch: OUT.
5. Tape selector: Normal.
6. Bias-adjustment control: Center.
7. Meter brightness control: Center.
8. Monitor switch: Tape position.

| ITEM                                                                                                                                                                                                         | MEASUREMENT & ADJUSTMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A Combination head adjustment</b><br>Condition:<br>* Playback mode<br>Equipment:<br>* VTVM<br>* Oscilloscope<br>* Test tape (Tape-path viewer with mirror) ... QZZCRD<br>* Test tape (azimuth) ... QZZCFM | <ol style="list-style-type: none"> <li>1. Test equipment connection is shown in fig. 8.</li> <li>2. Playback the test tape (QZZCRD).</li> <li>3. In this condition, adjust screws (A) and (B) shown in fig. 9 and 11 so that the tape may not get curled or malformed by tape guides of the erase head and the combination head (Fig. 10 shows correct condition).</li> </ol> <p><b>NOTE:</b> For the combination head carefully adjust the height so that the head surface contacts the tape in parallel shown in fig. 11.</p> <ol style="list-style-type: none"> <li>4. Playback the azimuth tape (QZZCFM 8 kHz).</li> <li>5. Adjust the combination head angle adjustment screw (C) in fig. 9 so that the output level at LINE OUT becomes maximum.</li> <li>6. Measure both channels, and adjust levels for equal output.</li> <li>7. After adjustment, lock the head adjustment screws with lacquer.</li> </ol>  <p><b>Fig. 8</b></p>  <p><b>Fig. 9</b></p>  <p><b>Fig. 10</b></p>  <p><b>Fig. 11</b></p> |
| <b>B Tape speed accuracy</b><br>Condition:<br>* Playback mode<br>Equipment:<br>* Digital electronic counter or frequency counter<br>* Test tape ... QZZCWAT                                                  | <ol style="list-style-type: none"> <li>1. Test equipment connection is shown in fig. 12.</li> <li>2. Playback test tape (QZZCWAT 3,000 Hz), and supply playback signal to frequency counter.</li> <li>3. Measure this frequency.</li> <li>4. On the basis of 3,000 Hz, determine value by following formula:<br/> <math display="block">\text{Tape speed accuracy} = \frac{f - 3,000}{3,000} \times 100 (\%)</math>           where, f = measured value         </li> <li>5. Take measurement at middle section of tape.</li> </ol> <p><b>Standard value: <math>\pm 1.5\%</math></b></p> <p><b>Adjustment method</b></p> <ol style="list-style-type: none"> <li>1. Playback the test tape (middle).</li> <li>2. Adjust tape speed adjustment VR (shown in fig. 29) so that frequency becomes 3,000 Hz.</li> </ol> <p><b>Tape speed fluctuation</b></p> <p>Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows:</p> $\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3,000} \times 100 (\%)$ <p><math>f_1</math> = maximum value, <math>f_2</math> = minimum value</p> <p><b>Standard value: 1%</b></p>  <p><b>Fig. 12</b></p>                    |
| <b>C Playback frequency response</b><br>Condition:<br>* Playback mode<br>* Output level control ... MAX<br>Equipment:<br>* VTVM<br>* Oscilloscope<br>* Test tape ... QZZCFM                                  | <ol style="list-style-type: none"> <li>1. Test equipment connection is as same as "Head azimuth adjustment" but use the test tape instead of head azimuth tape (See fig. 8).</li> <li>2. Place UNIT into playback mode.</li> <li>3. Playback frequency response test tape.</li> </ol> <p><b>Playback frequency response chart</b></p>  <p><b>Fig. 13</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| ITEM                                                                                                                                                                                                                                                | MEASUREMENT & ADJUSTMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |       |        |               |               |               |       |       |        |               |               |               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------|--------|---------------|---------------|---------------|-------|-------|--------|---------------|---------------|---------------|
|                                                                                                                                                                                                                                                     | <div><div><div>4. Measure output level at 10kHz, 8kHz, 4kHz, 1kHz, 315Hz, 250Hz, 125Hz and 63Hz, and compare each output level with standard frequency 315Hz, at LINE OUT.</div><div>5. Make measurement for both channels.</div><div>6. Make sure that the measured value is within the range specified in the frequency response chart.</div></div><div><div>Adjustment method</div><div><div>1. At 4kHz</div><div>If the measured output level at 4kHz is not equal output level at 315Hz, Adjust VR1 (L-CH) and VR2 (R-CH).</div></div><div><div>2. At high frequency range</div><div>If the measured value is not within standard (shown in fig. 13) at high frequency range, change the soldering point as the following examples.</div><div><div>a. When the output level decreases as shown in fig. 14, solder the connection point (B) on the printed circuit board (See fig. 16).</div></div></div></div><div><div><div>The corrected value</div><table><tr><td>6 kHz</td><td>8 kHz</td><td>10 kHz</td></tr><tr><td>about +0.4 dB</td><td>about +0.8 dB</td><td>about +1.3 dB</td></tr></table></div><div><div>b. When the output level increases as shown in fig. 15, unsolder the connection point (A) on the printed circuit board (See fig. 16).</div></div></div><div><div><div>The corrected value</div><table><tr><td>6 kHz</td><td>8 kHz</td><td>10 kHz</td></tr><tr><td>about -0.4 dB</td><td>about -1.0 dB</td><td>about -1.6 dB</td></tr></table></div><div><div><div>Fig. 14</div><div>Fig. 15</div></div></div></div></div> | 6 kHz         | 8 kHz | 10 kHz | about +0.4 dB | about +0.8 dB | about +1.3 dB | 6 kHz | 8 kHz | 10 kHz | about -0.4 dB | about -1.0 dB | about -1.6 dB |
| 6 kHz                                                                                                                                                                                                                                               | 8 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10 kHz        |       |        |               |               |               |       |       |        |               |               |               |
| about +0.4 dB                                                                                                                                                                                                                                       | about +0.8 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | about +1.3 dB |       |        |               |               |               |       |       |        |               |               |               |
| 6 kHz                                                                                                                                                                                                                                               | 8 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10 kHz        |       |        |               |               |               |       |       |        |               |               |               |
| about -0.4 dB                                                                                                                                                                                                                                       | about -1.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | about -1.6 dB |       |        |               |               |               |       |       |        |               |               |               |
|                                                                                                                                                                                                                                                     | <div><div><div>Connection points (A) for playback EQ adjustment.</div><div><div><div><div></div></div></div><div><div><div></div></div></div></div><div><div>Connection points (B) for playback EQ adjustment</div><div>Connection point (C) for bias current ON or OFF.</div></div></div><div><div>Fig. 16</div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |       |        |               |               |               |       |       |        |               |               |               |
| <div><div>Ⓢ Playback gain</div><div>Condition:</div><div><div>* Playback mode</div><div>* Output level control ... MAX</div></div><div>Equipment:</div><div><div>* VTVM</div><div>* Oscilloscope</div><div>* Test tape ... QZZCFM</div></div></div> | <div><div><div>1. Test equipment connection is shown in fig. 8.</div><div>2. Playback standard recording level portion on test tape (QZZCFM 315Hz), and using VTVM measure the output level at LINE OUT jack.</div><div>3. Make measurement for both channels.</div></div><div><div>Standard value: 0.65 V</div></div><div><div>Adjustment method</div><div><div>1. If measured value is not standard, adjust VR3 (L-CH), VR4 (R-CH) (See fig. 28 on page 6).</div><div>2. After adjustment, check "Playback frequency response" again.</div></div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |       |        |               |               |               |       |       |        |               |               |               |



| ITEM                                                                                                                                                                                                                                                                                                                                                                                | MEASUREMENT & ADJUSTMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>㊦ Recording current</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record mode</li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* Oscilloscope</li> <li>* AF oscillator</li> <li>* ATT</li> </ul>                                                                                                                      | <ol style="list-style-type: none"> <li>Test equipment connection is shown in fig. 17.</li> <li>Stop bias oscillation by unsoldering the connection point (C) for bias current ON or OFF in fig. 16.</li> <li>Supply 1 kHz signal (−24 dB) and adjust ATT until monitor level at LINE OUT becomes 0.65 V.</li> <li>Measure voltage and then calculate recording current by formula given below.</li> </ol> <div style="text-align: center;"> <math display="block">\text{Recording current} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}</math> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Standard value: around 230μA (Metal position), around 180μA (CrO<sub>2</sub> position), around 150μA (Fe-Cr position), around 150μA (Normal position)</b></p> </div> <ol style="list-style-type: none"> <li>If the measured value is not within standard, adjust the following VR. <ul style="list-style-type: none"> <li>Metal position ..... VR205 (L-CH), VR206 (R-CH)</li> <li>CrO<sub>2</sub> position ..... VR207 (L-CH), VR208 (R-CH)</li> <li>Fe-Cr position ..... VR209 (L-CH), VR210 (R-CH)</li> <li>Normal position ..... VR211 (L-CH), VR212 (R-CH)</li> </ul> </li> </ol> |
| <p><b>㊦ Bias leak</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record mode</li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* Oscilloscope</li> </ul>                                                                                                                                                                      | <ol style="list-style-type: none"> <li>Test equipment connection is shown in fig. 18.</li> <li>Place UNIT into record mode.</li> <li>Adjust trap coil L207 (L-CH), L208 (R-CH), so that measured value on VTVM becomes minimum.</li> <li>Take adjustment for both channels.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p><b>㊦ Erase current</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record mode</li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* Oscilloscope</li> </ul>                                                                                                                                                                  | <ol style="list-style-type: none"> <li>Test equipment connection is shown in fig. 19.</li> <li>Read voltage on VTVM and calculate erase current by following formula:</li> </ol> <div style="text-align: center;"> <math display="block">\text{Erase current (A)} = \frac{\text{Value read on VTVM (V)}}{1 (\Omega)}</math> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Standard value: More than 95mA (Metal position), More than 68mA (CrO<sub>2</sub> position), More than 55mA (Fe-Cr position), More than 45mA (Normal position)</b></p> </div> <ol style="list-style-type: none"> <li>If measured value is not standard, adjust the following VR. <ul style="list-style-type: none"> <li>Metal position ..... VR407, CrO<sub>2</sub> position ..... VR406, Fe-Cr position ..... VR405, Normal position ..... VR404</li> </ul> </li> </ol>                                                                                                                                                                                                                                                                                                                                          |
| <p><b>㊦ Bias current</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Bias adjustment control ... Center</li> <li>* Record mode</li> <li>* When bias current is adjusted on one channel only, note that bias current on the other channel may vary.</li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* Oscilloscope</li> </ul> | <ol style="list-style-type: none"> <li>Test equipment connection is shown in fig. 20.</li> <li>Place UNIT into record mode, and tape selector to "Normal".</li> <li>Read voltage on VTVM and calculate bias current by following formula:</li> </ol> <div style="text-align: center;"> <math display="block">\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}</math> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Standard value: around 2.2mA (Metal position), around 1.6mA (CrO<sub>2</sub> position), around 1.3mA (Fe-Cr position), around 1.1mA (Normal position)</b></p> </div> <ol style="list-style-type: none"> <li>Adjust VR401 (L-CH), VR402 (R-CH) (See fig. 28).</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p><b>㊦ Overall gain</b></p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record/playback mode</li> <li>* Input level control ... MAX</li> <li>* Output level control ... MAX</li> <li>* Standard input level; <ul style="list-style-type: none"> <li>MIC ..... −72 ± 4 dB</li> <li>LINE IN ... −24 ± 3 dB</li> <li>DIN ..... −41 ± 3 dB</li> </ul> </li> </ul>       | <ol style="list-style-type: none"> <li>Test equipment connection is shown in fig. 21.</li> <li>Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE IN.</li> <li>Adjust ATT until monitor level at LINE OUT becomes 0.65 V.</li> <li>Using test tape, make recording.</li> <li>Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.65 V.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

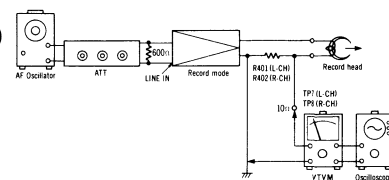


Fig. 17

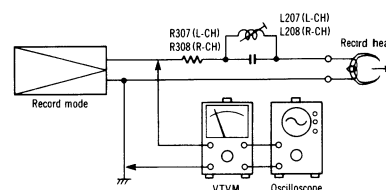


Fig. 18

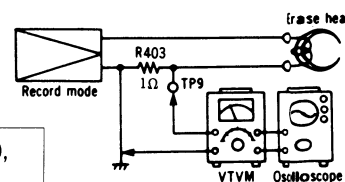


Fig. 19

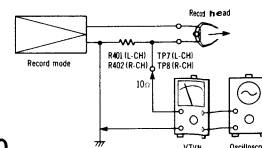


Fig. 20

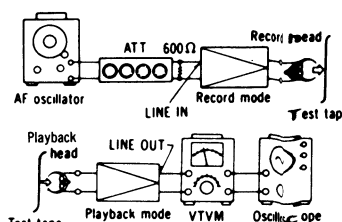


Fig. 21

| ITEM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | MEASUREMENT & ADJUSTMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Equipment:</p> <ul style="list-style-type: none"> <li>* AF oscillator</li> <li>* VTVM</li> <li>* Oscilloscope</li> <li>* ATT</li> <li>* Test tape (reference blank tape) <ul style="list-style-type: none"> <li>... QZZCRA for Normal</li> <li>... QZZCRX for CrO<sub>2</sub></li> <li>... QZZCRY for Fe-Cr</li> <li>... QZZCRZ for Metal</li> </ul> </li> </ul>                                                                                                                                                                                       | <p>6. If measured value is not 0.65 V, adjust following VR.</p> <p>Metal position ..... VR205 (L-CH), VR206 (R-CH)</p> <p>CrO<sub>2</sub> position ..... VR207 (L-CH), VR208 (R-CH)</p> <p>Fe-Cr position ..... VR209 (L-CH), VR210 (R-CH)</p> <p>Normal position ..... VR211 (L-CH), VR212 (R-CH)</p> <p>7. Repeat from step (2).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p>● Fluorescent meter</p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record mode</li> <li>* Input level control ... MAX</li> <li>* Output level control ... MAX</li> <li>* Tape selectors <ul style="list-style-type: none"> <li>... Normal position</li> </ul> </li> <li>* Monitor switch <ul style="list-style-type: none"> <li>... Source position</li> </ul> </li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* AF oscillator</li> <li>* ATT</li> </ul>                                          | <p>1. Test equipment connection is shown in fig. 21.</p> <p>2. Set the meter brightness control to "BRIGHT" position.</p> <p>3. Supply 1kHz signal (−24 dB) to the LINE IN jack, then press the record button.</p> <p>4. Adjust the ATT so that the output level at LINE OUT jack becomes 0.65 V (= standard input level).</p> <p>5. Adjustment at "0 dB":</p> <p>A. Adjust VR103 (L-CH) and VR104 (R-CH) so that the Fluorescent meters show an illuminated indication up to "0 dB" when the input signal level is 0.9 dB higher than the standard input level.</p> <p>B. Then confirm that the Fluorescent meters show an illuminated indication up to "+1 dB" when the input signal level is 1 dB higher than the standard input level.</p> <p>6. Adjustment at "−20 dB":</p> <p>A. Adjust VR101 (L-CH) and VR102 (R-CH) so that the Fluorescent meters show an illuminated indication up to "−20 dB" when the input signal level is 15.1 dB lower than the standard input level.</p> <p>B. Then confirm that the Fluorescent meters show an illuminated indication up to "−15 dB" when the input signal level is 15 dB lower than the standard input level.</p>                                                                                                                                                                                 |
| <p>Ⓚ Overall frequency response</p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record/playback mode</li> <li>* Input level control ... MAX</li> <li>* Output level control ... MAX</li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* AF oscillator</li> <li>* ATT</li> <li>* Test tape (reference blank tape) <ul style="list-style-type: none"> <li>... QZZCRA for Normal</li> <li>... QZZCRX for CrO<sub>2</sub></li> <li>... QZZCRY for Fe-Cr</li> <li>... QZZCRZ for Metal</li> </ul> </li> </ul> | <p><b>Note:</b></p> <p>Before measuring, and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response).</p> <p>1. Test equipment connection is shown in fig. 21.</p> <p>2. Load reference blank test tape and place UNIT into record mode.</p> <p>3. Supply 1kHz signal from AF oscillator through ATT to LINE IN.</p> <p>4. Adjust ATT so that input level is −20 dB below standard recording level (standard recording level = 0 VU).</p> <p>5. At this time, LINE OUT level the indicates 0.065 V.</p> <p>6. Record each frequency 50 Hz, 100 Hz, 200 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 10 kHz and 13 kHz (15 kHz for Metal tape, CrO<sub>2</sub> tape or Fe-Cr tape) at the same level.</p> <p>7. Playback and express in dB the difference between playback output level of each frequency based on playback output level of 1 kHz.</p> <p>8. Make sure that the measured value is within the range specified in the overall frequency response chart.</p> <p>9. Set the bias selector to CrO<sub>2</sub>, Fe-Cr or Metal position.</p> <p>10. Measure as same as manner above.</p> <p>11. Make sure that the measured value is within the range specified in the overall frequency response chart for CrO<sub>2</sub>, Fe-Cr or Metal tape shown in fig. 25.</p> |

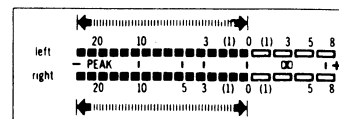


Fig. 22

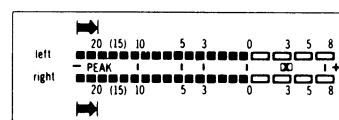


Fig. 23

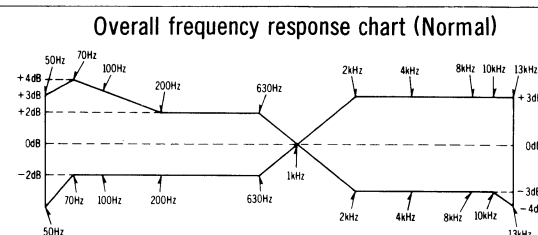


Fig. 24

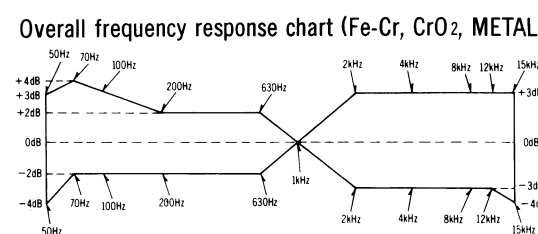


Fig. 25

| ITEM                                                                                                                                                                                                                                                                                          | MEASUREMENT & ADJUSTMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Ⓛ Overall frequency response adjustment (As a standard for adjustment)</p>                                                                                                                                                                                                                 | <p><b>Adjustment 1—Using bias current</b></p> <p>1. When the frequency response between the middle and high frequency range becomes higher than the standard value, as shown by the solid line in fig. 26, increase the bias current by turning following VR.</p> <p>Metal position ..... VR407, CrO<sub>2</sub> position ..... VR406, Fe-Cr position ..... VR405, Normal position ..... VR404</p> <p>2. When it becomes lower, as shown by dotted line, reduce the bias current by turning following VR.</p> <p>Metal position ..... VR407, CrO<sub>2</sub> position ..... VR406, Fe-Cr position ..... VR405, Normal position ..... VR404</p> <p><b>Note:</b></p> <p>1. For adjustment when the bias current is lower than the standard value use the procedure indicated in adjustment 2, because reducing the bias current beyond this point may worsen the distortion factor.</p> <p>2. For the method of bias current measurement, refer to "Bias current adjustment" on page 5.</p> <p><b>Adjustment 2—Using the peaking coil for recording equalization</b></p> <p>When the frequency response is flat in the middle frequency range and makes a sharp rise or drop in the high frequency range, as shown in fig. 27, adjust by turning following peaking coil.</p> <p>Metal position } ..... L205 (L-CH), L206 (R-CH)</p> <p>CrO<sub>2</sub> position } ..... L205 (L-CH), L206 (R-CH)</p> <p>Fe-Cr position } ..... L205 (L-CH), L206 (R-CH)</p> <p>Normal position ..... L203 (L-CH), L204 (R-CH)</p> |
| <p>Ⓜ Dolby NR circuit</p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record mode</li> <li>* Input level control ... MAX</li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* AF oscillator</li> <li>* ATT</li> <li>* Oscilloscope</li> </ul> | <p>1. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain −35 dB at TP5 (L-CH), TP6 (R-CH) (frequency 5 kHz).</p> <p>2. Confirm that the value at IN position is 8 (± 1) dB greater than the value at OUT position of Dolby NR switch.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

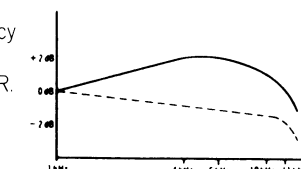


Fig. 26

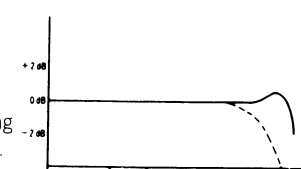
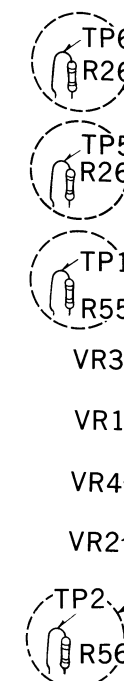


Fig. 27



| ITEM                                                                                                                                                                                                                                                                                          | MEASUREMENT & ADJUSTMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>● Overall frequency response adjustment (As a standard for adjustment)</p>                                                                                                                                                                                                                 | <p><b>Adjustment 1—Using bias current</b></p> <ol style="list-style-type: none"> <li>When the frequency response between the middle and high frequency range becomes higher than the standard value, as shown by the solid line in fig. 26, increase the bias current by turning following VR.<br/>Metal position ..... VR407, CrO<sub>2</sub> position ..... VR406, Fe-Cr position ..... VR405, Normal position ..... VR404</li> <li>When it becomes lower, as shown by dotted line, reduce the bias current by turning following VR.<br/>Metal position ..... VR407, CrO<sub>2</sub> position ..... VR406, Fe-Cr position ..... VR405, Normal position ..... VR404</li> </ol> <p><b>Note:</b></p> <ol style="list-style-type: none"> <li>For adjustment when the bias current is lower than the standard value use the procedure indicated in adjustment 2, because reducing the bias current beyond this point may worsen the distortion factor.</li> <li>For the method of bias current measurement, refer to "Bias current adjustment" on page 5.</li> </ol> <p><b>Adjustment 2—Using the peaking coil for recording equalization</b></p> <p>When the frequency response is flat in the middle frequency range and makes a sharp rise or drop in the high frequency range, as shown in fig. 27, adjust by turning following peaking coil.</p> <p>Metal position ..... L205 (L-CH), L206 (R-CH)<br/>CrO<sub>2</sub> position ..... L203 (L-CH), L204 (R-CH)<br/>Fe-Cr position ..... L203 (L-CH), L204 (R-CH)<br/>Normal position ..... L203 (L-CH), L204 (R-CH)</p> |
| <p>● Dolby NR circuit</p> <p>Condition:</p> <ul style="list-style-type: none"> <li>* Record mode</li> <li>* Input level control ... MAX</li> </ul> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* VTVM</li> <li>* AF oscillator</li> <li>* ATT</li> <li>* Oscilloscope</li> </ul> | <ol style="list-style-type: none"> <li>Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain -35 dB at TP5 (L-CH), TP6 (R-CH) (frequency 5 kHz).</li> <li>Confirm that the value at IN position is 8 (±1) dB greater than the value at OUT position of Dolby NR switch.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## ADJUSTMENT PARTS LOCATION

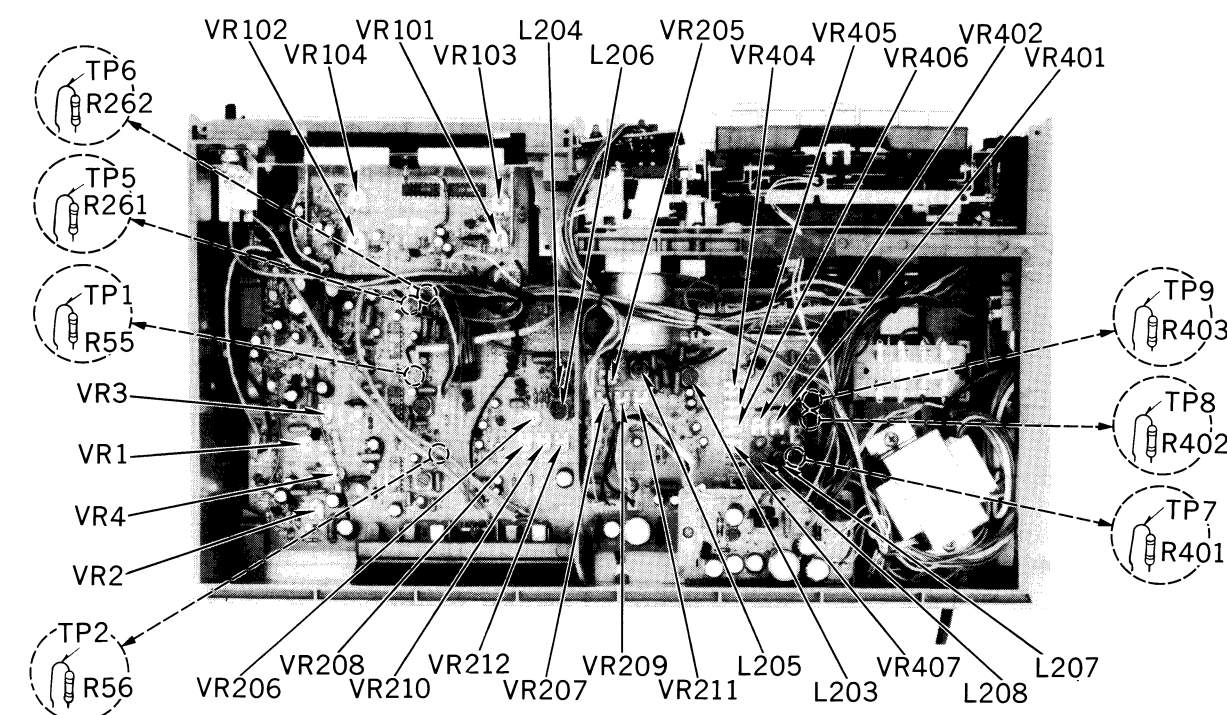
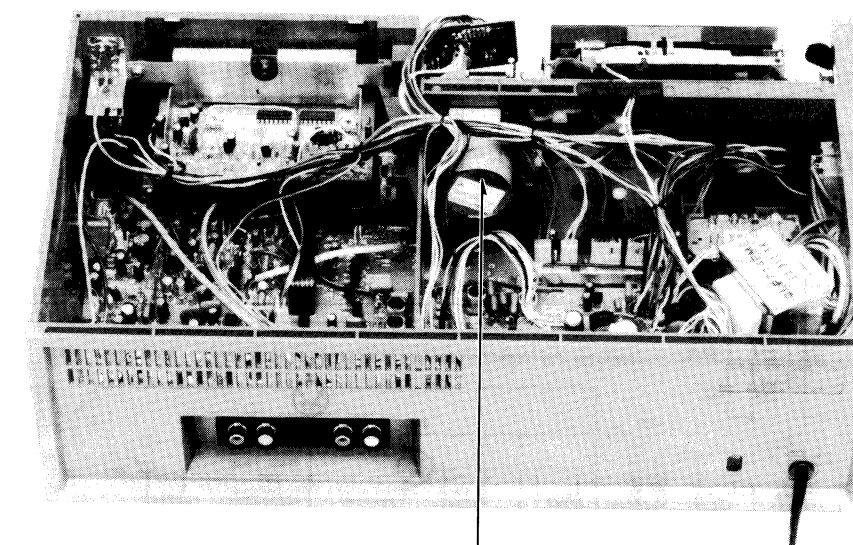


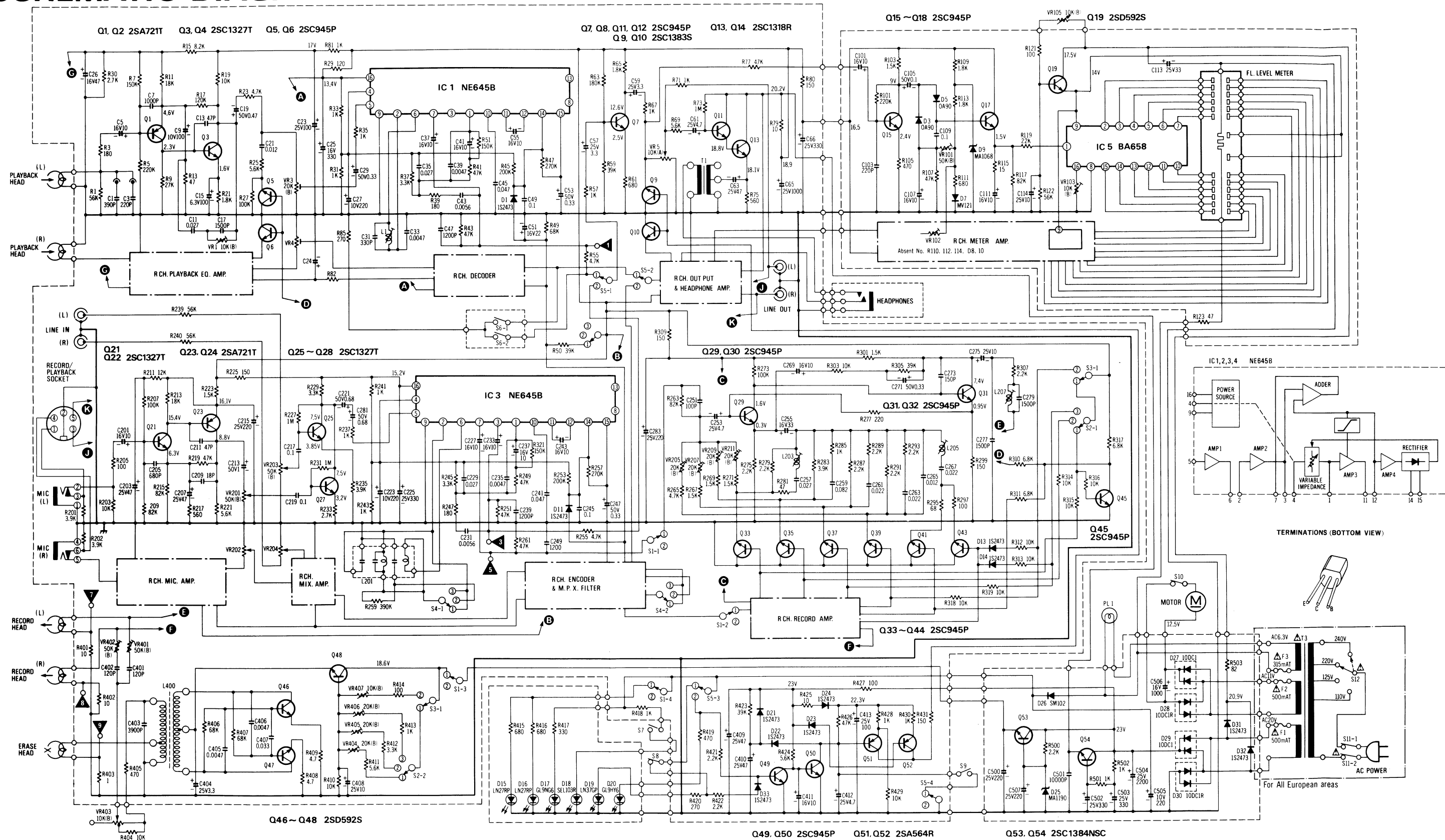
Fig. 28



Tape speed adjustment VR

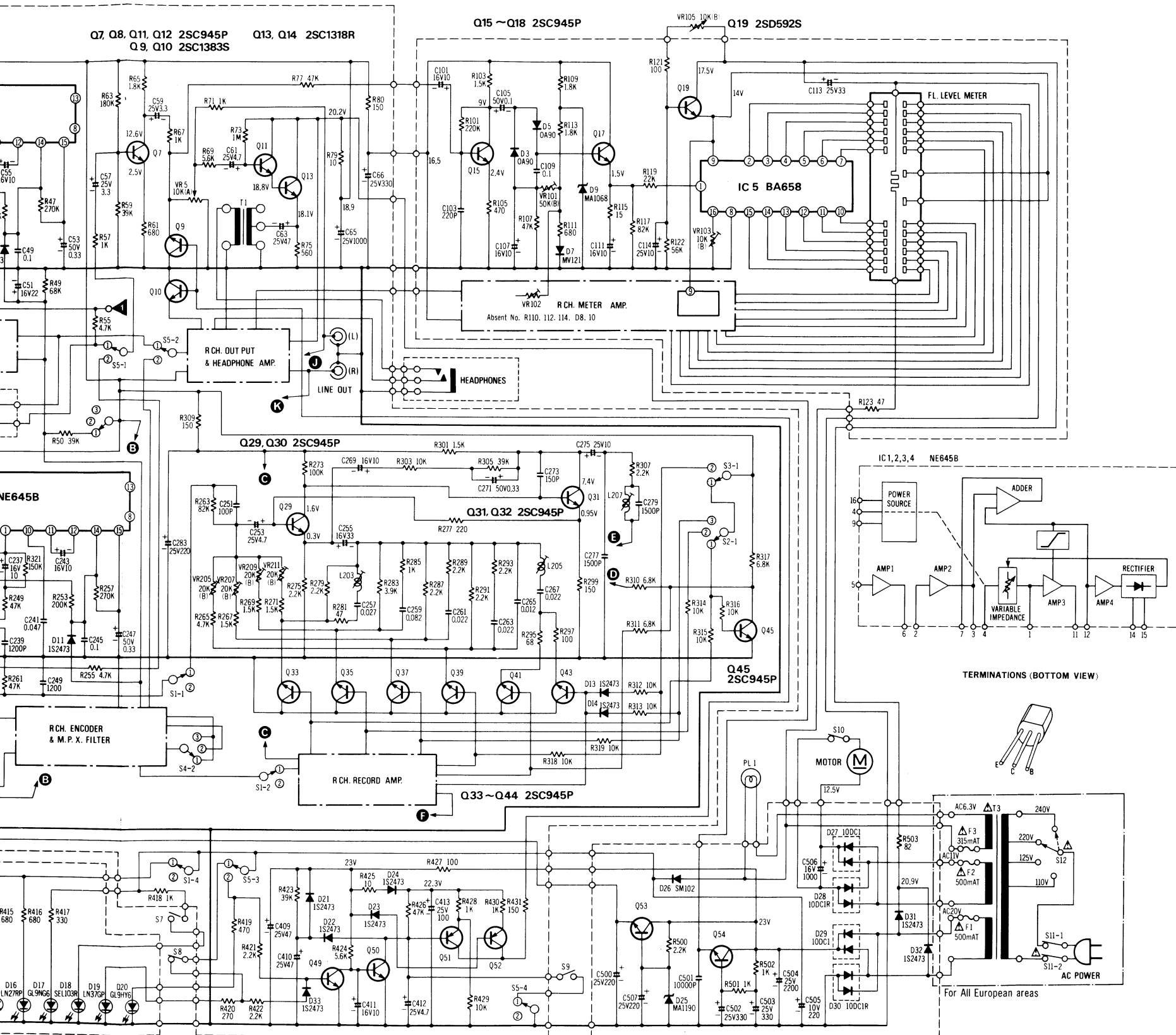
Fig. 29

## SCHEMATIC DIAGRAM



## NOTE:

1. S1-1~S1-4 ..... Record/playback select switch (shown in record position).
2. S2-1, S2-2 ..... Tape select switch (1... Normal, 2... Fe-Cr, 3... CrO<sub>2</sub>).
3. S3-1, S3-2 ..... Metal tape select switch (1... OUT, 2... Metal).
4. S4-1~S4-3 ..... Dolby and MPX filter IN/OUT select switch (1... Dolby OUT, Filter OUT, 2... Dolby IN, Filter OUT, 3... Dolby IN, Filter IN).
5. S5-1~S5-4 ..... Monitor select switch (1... Tape monitor, 2... Source monitor).
6. S6-1, S6-2 ..... Cue/review switch (shown in OFF position).
7. S7 ..... Memory switch (shown in OFF position).
8. S8 ..... Playback switch (shown in ON position).
9. S9 ..... Pause switch (shown in OFF position).
10. S10 ..... Motor ON/OFF switch (shown in ON position).
11. S11 ..... Power ON/OFF switch (shown in ON position).
12. S12 ..... AC power voltage select switch.
13. VR1, 2 ..... Playback equalizer adjustment VR.
14. VR3, 4 ..... Playback gain adjustment VR.
15. VR5, 6 ..... Output level control.
16. VR101, 102 ..... Level meter adjustment VR (for -20dB indication).
17. VR103, 104 ..... Level meter adjustment VR (for 0dB indication).
18. VR105 ..... Meter brightness control.
19. VR201, 202 ..... MIC level control.
20. VR203, 204 ..... LINE IN level control.
21. VR205, 206 ..... Recording gain adjustment VR (for Metal tape).
22. VR207, 208 ..... Recording gain adjustment VR (for CrO<sub>2</sub> tape).
23. VR209, 210 ..... Recording gain adjustment VR (for Fe-Cr tape).
24. VR211, 212 ..... Recording gain adjustment VR (for Normal tape).
25. VR401, 402 ..... Bias current adjustment VR, VR401 (L-CH), VR402 (R-CH).
26. VR403 ..... Bias current control.
27. VR404 ..... Bias current adjustment VR (for Normal tape).
28. VR405 ..... Bias current adjustment VR (for Fe-Cr tape).
29. VR406 ..... Bias current adjustment VR (for CrO<sub>2</sub> tape).
30. VR407 ..... Bias current adjustment VR (for Metal tape).
31. L1, 2 ..... Bias trap coil.
32. L201, 202 ..... MPX filter coil.
33. L203, 204 ..... Recording equalizer adjustment coil (for Normal tape).
34. L205, 206 ..... Recording equalizer adjustment coil (for Fe-Cr, CrO<sub>2</sub> and Metal tape).
35. L207, 208 ..... Bias leakage adjustment coil.
36. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K = 1,000Ω.
37. Capacitor values are in microfarads (μF) unless specified otherwise. P = Pico-farads.
38. All voltage values shown in circuitry are under no signal condition with volume control at minimum position.
39. For measurement, use VTVM.
40. The mark (▼) shows test point. e.g. ▼ = Test point 1.

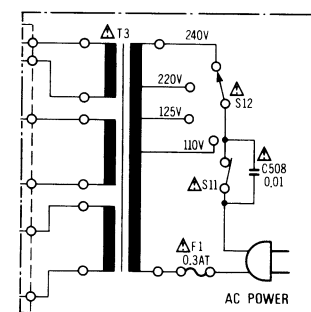


**NOTE: RESISTORS**  
 ERD ... Carbon  
 ERG ... Metal-oxide  
 ERO ... Metal-film  
 ERX ... Metal-film  
 ERQ ... Fuse type metallic  
 ERC ... Solid  
 ERF ... Cement

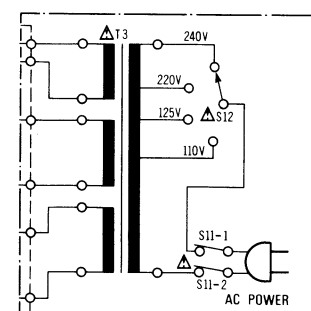
**CAPACITORS**  
 ECG ... Ceramic  
 ECK ... Ceramic  
 ECR ... Ceramic  
 ECF ... Ceramic  
 ECQ ... Polyester  
 ECQ ... Polyester  
 ECQ ... Polypropylene  
 ECE ... Electrolytic  
 ECE ... Non polar electrolytic  
 ECQ ... Polystyrene  
 ECS ... Tantalum

**NOTE:** Δ indicates that only parts specified by the manufacturer be used for safety.

| Ref. No.                | Part No.    | Ref. No.  | Part No.   | Ref. No.                                | Part No.   | Ref. No.  | Part No.   | Ref. No.            | Part No.    | Ref. No. | Part No. |
|-------------------------|-------------|-----------|------------|-----------------------------------------|------------|-----------|------------|---------------------|-------------|----------|----------|
| <b>RESISTORS</b>        |             |           |            |                                         |            |           |            |                     |             |          |          |
| R1, 2                   | ERD25TJ563  | R215, 216 | ERD25TJ683 | R285, 286                               | ERD25TJ102 | R428      | ERD25TJ102 | C47, 48             | ECKD1H122K  |          |          |
| R3, 4                   | ERD25TJ181  |           |            | R287, 288, 289, 290, 291, 292, 293, 294 | ERD25TJ102 | R429      | ERD25TJ103 | C49, 50             | ECQM05104KZ |          |          |
| R5, 6                   | ERD25TJ224  |           |            |                                         |            | R430      | ERD25TJ102 | C51                 | ECEA1HS220  |          |          |
| R7, 8                   | ERD25TJ154  |           |            |                                         |            | R431      | ERD25TJ151 | C53, 54             | ECEA50Z833  |          |          |
| R9, 10                  | ERD25TJ273  |           |            |                                         |            | R500      | ERD25TJ222 | C55, 56             | ECEA1HS100  |          |          |
| R11, 12                 | ERD25TJ183  |           |            |                                         |            | R501, 502 | ERD25TJ102 | C57, 58, 59, 60     | ECEA50Z3R3  |          |          |
| R13, 14                 | ERD25TJ470  |           |            |                                         |            | R503      | ERD25TJ102 | C61, 62             | ECEA25Z47   |          |          |
| R15, 16                 | ERD25TJ822  |           |            |                                         |            | R504      | ERD25TJ102 | C63, 64             | ECEA1ES470  |          |          |
| R17, 18                 | ERD25TJ124  |           |            |                                         |            | R505      | ERD25TJ102 | C65                 | ECEA1VS102  |          |          |
| R19, 20                 | ERD25TJ103  |           |            |                                         |            | R506      | ERD25TJ102 | C66                 | ECEA1ES331  |          |          |
| R21, 22                 | ERD25TJ182  |           |            |                                         |            | R507      | ERD25TJ102 | C101, 102           | ECEA1HS100  |          |          |
| R23, 24                 | ERD25TJ472  |           |            |                                         |            | R508      | ERD25TJ102 | C103, 104           | ECKD1H221K  |          |          |
| R25, 26                 | ERD25TJ562  |           |            |                                         |            | R509      | ERD25TJ102 | C105, 106           | ECEA50Z1R1  |          |          |
| R27, 28                 | ERD25TJ104  |           |            |                                         |            | R510      | ERD25TJ102 | C107, 108           | ECEA1HS100  |          |          |
| R29                     | ERD25TJ121  |           |            |                                         |            | R511      | ERD25TJ102 | C109, 110           | ECFDD104KXY |          |          |
| R30                     | ERD25TJ272  |           |            |                                         |            | R512      | ERD25TJ102 | C111, 112           | ECEA1HS100  |          |          |
| R31, 32, 33, 34, 35, 36 | ERD25TJ102  |           |            |                                         |            | R513      | ERD25TJ102 | C113                | ECEA1ES330  |          |          |
| R37, 38                 | ERD25TJ181  |           |            |                                         |            | R514      | ERD25TJ102 | C114                | ECEA1ES100  |          |          |
| R39, 40                 | ERD25TJ181  |           |            |                                         |            | R515      | ERD25TJ102 | C201, 202           | ECEA16M10   |          |          |
| R41, 42, 43, 44         | ERD25TJ473  |           |            |                                         |            | R516      | ERD25TJ102 | C203, 204           | ECEA1ES470  |          |          |
| R45, 46                 | ERD25TJ2003 |           |            |                                         |            | R517      | ERD25TJ102 | C205, 206           | ECKD1H681K  |          |          |
| R47, 48                 | ERD25TJ274  |           |            |                                         |            | R518      | ERD25TJ102 | C207, 208           | ECEA1ES470  |          |          |
| R49                     | ERD25TJ683  |           |            |                                         |            | R519      | ERD25TJ102 | C209, 210           | ECCD1H180K  |          |          |
| R50                     | ERD25TJ393  |           |            |                                         |            | R520      | ERD25TJ102 | C211, 212           | ECCD1H470K  |          |          |
| R55, 56                 | ERD25TJ472  |           |            |                                         |            | R521      | ERD25TJ102 | C213, 214           | ECEA50Z1    |          |          |
| R57, 58                 | ERD25TJ102  |           |            |                                         |            | R522      | ERD25TJ102 | C215, 216           | ECEA1ES221  |          |          |
| R59, 60                 | ERD25TJ393  |           |            |                                         |            | R523      | ERD25TJ102 | C217, 218, 219, 220 | ECQM05104KZ |          |          |
| R61, 62                 | ERD25TJ681  |           |            |                                         |            | R524      | ERD25TJ102 | C221, 222           | ECEA50Z833  |          |          |
| R63, 64                 | ERD25TJ184  |           |            |                                         |            | R525      | ERD25TJ102 | C223, 224           | ECEA1AS221  |          |          |
| R65, 66                 | ERD25TJ182  |           |            |                                         |            | R526      | ERD25TJ102 | C225, 226           | ECEA1ES331  |          |          |
| R67, 68                 | ERD25TJ102  |           |            |                                         |            | R527      | ERD25TJ102 | C227, 228           | ECEA1HS100  |          |          |
| R69, 70                 | ERD25TJ562  |           |            |                                         |            | R528      | ERD25TJ102 | C229, 230           | ECQM05273JZ |          |          |
| R71, 72                 | ERD25TJ102  |           |            |                                         |            | R529      | ERD25TJ102 | C231, 232           | ECQM05562JZ |          |          |
| R73, 74                 | ERD25TJ105  |           |            |                                         |            | R530      | ERD25TJ102 | C233, 234           | ECEA1HS100  |          |          |
| R75, 76                 | ERD25TJ561  |           |            |                                         |            | R531      | ERD25TJ102 | C235, 236           | ECQM05472JZ |          |          |
| R77, 78                 | ERD25TJ473  |           |            |                                         |            | R532      | ERD25TJ102 | C237, 238           | ECEA1HS100  |          |          |
| R79                     | ERX1ANJ100  |           |            |                                         |            | R533      | ERD25TJ102 | C239, 240           | ECKD1H122K  |          |          |
|                         |             |           |            |                                         |            | R534      | ERD25TJ102 | C241, 242           | ECQM05473JZ |          |          |
|                         |             |           |            |                                         |            | R535      | ERD25TJ102 |                     |             |          |          |



For Asia, Latin America, Middle East and Africa areas



For All European areas



For Australia

**SPECIFICATIONS**  
 \* Input level control ... MAX  
 \* Output level control ... MAX

|                                                                                                                                             |                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Playback S/N ratio<br>Test tape ... QZZCFM                                                                                                  | More than 47 dB                                                             |
| Overall distortion<br>Test tape<br>... QZZCRA for Normal<br>... QZZCRX for CrO <sub>2</sub><br>... QZZCRY for Fe-Cr<br>... QZZCRZ for Metal | Less than 2.3% (Normal)<br>Less than 3.3% (Fe-Cr, CrO <sub>2</sub> , Metal) |
| Overall S/N ratio<br>Test tape ... QZZCRA                                                                                                   | More than 43 dB<br>(without NAB filter)                                     |

22. VR207, 208 ... Recording gain adjustment VR (for CrO<sub>2</sub> tape).  
 23. VR209, 210 ... Recording gain adjustment VR (for Fe-Cr tape).  
 24. VR211, 212 ... Recording gain adjustment VR (for Normal tape).  
 25. VR401, 402 ... Bias current adjustment VR; VR401 (L-CH), VR402 (R-CH).  
 26. VR403 ... Bias current control.  
 27. VR404 ... Bias current adjustment VR (for Normal tape).  
 28. VR405 ... Bias current adjustment VR (for Fe-Cr tape).  
 29. VR406 ... Bias current adjustment VR (for CrO<sub>2</sub> tape).  
 30. VR407 ... Bias current adjustment VR (for Metal tape).  
 31. L1, 2 ... Bias trap coil.  
 32. L201, 202 ... MPX filter coil.  
 33. L203, 204 ... Recording equalizer adjustment coil (for Normal tape).  
 34. L205, 206 ... Recording equalizer adjustment coil (for Fe-Cr, CrO<sub>2</sub> and Metal tape).  
 35. L207, 208 ... Bias leakage adjustment coil.  
 36. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise.  
 K = 1,000Ω.  
 37. Capacitor values are in microfarads (μF) unless specified otherwise.  
 P = Pico-farads.  
 38. All voltage values shown in circuitry are under no signal condition with volume control at minimum position.  
 For measurement, use VTVM.  
 39. The mark (▼) shows test point. e.g. ▼ = Test point 1.



# CIRCUIT BOARD

## MAIN CIRCUIT BOARD

| Ref. No.            | Part No.    | Ref. No.  | Part No.                                                | Ref. No.                                                            | Part No.  |
|---------------------|-------------|-----------|---------------------------------------------------------|---------------------------------------------------------------------|-----------|
| C243, 244           | ECEA1HS100  | C279, 280 | ECQS1152K                                               | Q3, 4                                                               | 2SC1327S  |
| C245, 246           | ECQM05104KZ | C281, 282 | ECEA50ZR68                                              | Q5, 6, 7, 8                                                         | 2SC945P   |
| C247, 248           | ECEA50ZR33  | C283      | ECEA1ES221                                              | Q9, 10                                                              | 2SC1383S  |
| C249, 250           | ECKD1H122K  | C401, 402 | ECCD1H121KC                                             | Q11, 12                                                             | 2SC945P   |
| C251, 252           | ECCD1H101K  | C403      | ECQS1392K                                               | Q13, 14                                                             | 2SC1318P  |
| C253, 254           | ECEA25Z4R7  | C404      | ECEA50ZR33                                              | Q15, 16, 17, 18                                                     | 2SC945P   |
| C255, 256           | ECEA1CS330  | C405, 406 | ECQM05472KZ                                             | Q19                                                                 | 2SD592NCS |
| C257, 258           | ECQM05273KZ | C407      | ECQM05333KZ                                             | Q21, 22                                                             | 2SC1327S  |
| C259, 260           | ECQM05104KZ | C408      | ECEA1HS100                                              | Q23, 24                                                             | 2SA721    |
| C261, 262, 263, 264 | ECQM05223KZ | C409, 410 | ECEA1ES470                                              | Q25, 26, 27, 28                                                     | 2SC1327S  |
| C265, 266           | ECQM05123KZ | C411      | ECEA1HS100                                              | Q29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45 | 2SC945P   |
| C267, 268           | ECQM05223KZ | C412      | ECEA25Z4R7                                              | Q46, 47, 48                                                         | 2SD592NCS |
| C269, 270           | ECEA1HS100  | C413      | ECEA1ES101                                              | Q49, 50                                                             | 2SC945P   |
| C271, 272           | ECEA50ZR33  | C500      | ECEA1ES221                                              | Q51, 52                                                             | 2SA564R   |
| C273, 274           | ECCD1H151K  | C501      | ECKD1H103PF                                             | Q53, 54                                                             | 2SC1384   |
| C275, 276           | ECEA1HS100  | C502, 503 | ECEA1ES331                                              |                                                                     |           |
| C277, 278           | ECKD1H152K  | C504      | ECEA1CS222                                              |                                                                     |           |
|                     |             | C505      | ECEA1AS221                                              |                                                                     |           |
|                     |             | C506      | ECEA1HS102                                              |                                                                     |           |
|                     |             | C507      | ECEA1ES221                                              |                                                                     |           |
|                     |             | C508      | ECEA1ES221                                              |                                                                     |           |
|                     |             |           | *For Asia, Latin America, Middle East and Africa areas. |                                                                     |           |
|                     |             |           | <b>TRANSISTORS</b>                                      |                                                                     |           |
|                     |             | Q1, 2     | 2SA721                                                  |                                                                     |           |

### DIODES

D1, 2 IS2473

D3, 4, 5, 6 OA90M

D7 MV121

D9 MA1068

D11, 12, 13, 14 IS2473

D15, 16 LN27RP

D17 GL9NG6

D18 SEL103R

D19 LN37GP

D20 GL9HY6

D21, 22, 23, 24 IS2473

D25 MA1190

D26 SM102

D27 RVD10DC2

D28 RVD10DC2R

D29 RVD10DC2

D30 RVD10DC2R

D31, 32, 33 IS2473

D34 IS2473

D35 IS2473

D36 IS2473

D37 IS2473

D38 IS2473

D39 IS2473

D40 IS2473

D41 IS2473

D42 IS2473

D43 IS2473

D44 IS2473

D45 IS2473

D46 IS2473

D47 IS2473

D48 IS2473

D49 IS2473

D50 IS2473

D51 IS2473

D52 IS2473

D53 IS2473

D54 IS2473

D55 IS2473

D56 IS2473

D57 IS2473

D58 IS2473

D59 IS2473

D60 IS2473

D61 IS2473

D62 IS2473

D63 IS2473

D64 IS2473

D65 IS2473

D66 IS2473

D67 IS2473

D68 IS2473

D69 IS2473

D70 IS2473

D71 IS2473

D72 IS2473

D73 IS2473

D74 IS2473

D75 IS2473

D76 IS2473

D77 IS2473

D78 IS2473

D79 IS2473

### COILS

L1, 2 QLX1032W

L201, 202 QLM926K

L203, 204, 205, 206, 207, 208 QLX1032W

L400 QLB0158

L401 QLB0158

L402 QLB0158

L403 QLB0158

L404 QLB0158

L405 QLB0158

L406 QLB0158

L407 QLB0158

L408 QLB0158

L409 QLB0158

L410 QLB0158

L411 QLB0158

L412 QLB0158

L413 QLB0158

L414 QLB0158

L415 QLB0158

L416 QLB0158

L417 QLB0158

L418 QLB0158

L419 QLB0158

L420 QLB0158

L421 QLB0158

L422 QLB0158

L423 QLB0158

L424 QLB0158

L425 QLB0158

L426 QLB0158

L427 QLB0158

L428 QLB0158

L429 QLB0158

L430 QLB0158

L431 QLB0158

L432 QLB0158

L433 QLB0158

L434 QLB0158

L435 QLB0158

L436 QLB0158

L437 QLB0158

L438 QLB0158

L439 QLB0158

L440 QLB0158

### SWITCHES

S1 QSS7203

S2 QES1493

S3 QES1511

S4 QES1483

S5 QES1486

S6 QES1493

S7 QES1511

S8 QES1483

S9 QES1486

S10 QES1493

S11 QES1511

S12 QES1483

S13 QES1486

S14 QES1493

S15 QES1511

S16 QES1483

S17 QES1486

S18 QES1493

S19 QES1511

S20 QES1483

S21 QES1486

S22 QES1493

S23 QES1511

S24 QES1483

S25 QES1486

S26 QES1493

S27 QES1511

S28 QES1483

S29 QES1486

S30 QES1493

S31 QES1511

S32 QES1483

S33 QES1486

S34 QES1493

S35 QES1511

S36 QES1483

S37 QES1486

S38 QES1493

### FUSES

F1 XBAQ0003

F2 XBA2E03NS5

F3 XBAQ0003

F4 XBAQ0006

F5 XBAQ0006

F6 XBAQ0006

F7 XBAQ0006

F8 XBAQ0006

F9 XBAQ0006

F10 XBAQ0006

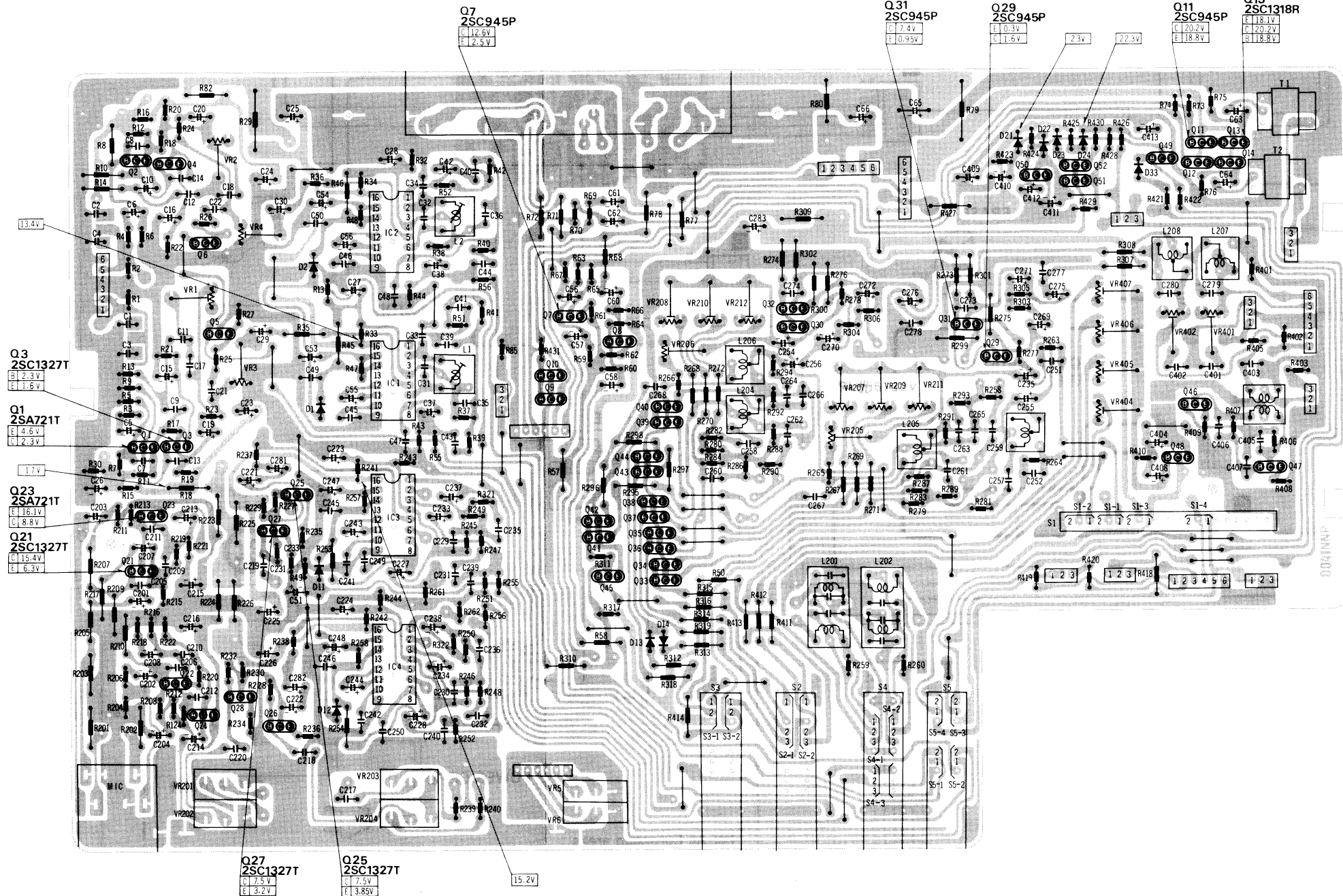
F11 XBAQ0006

F12 XBAQ0006

F13 XBAQ0006

F14 XBAQ0006

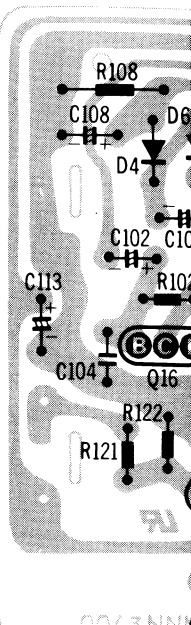
F15 XBAQ0006



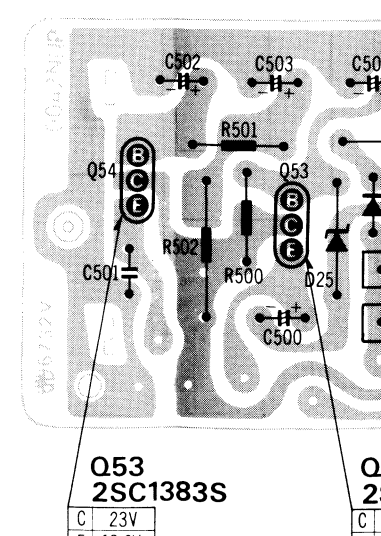
### NOTE:

The circuit shown in red on the conductor is B circuit.  
Values indicated in [ ] are DC voltage between the chassis and electrical parts.

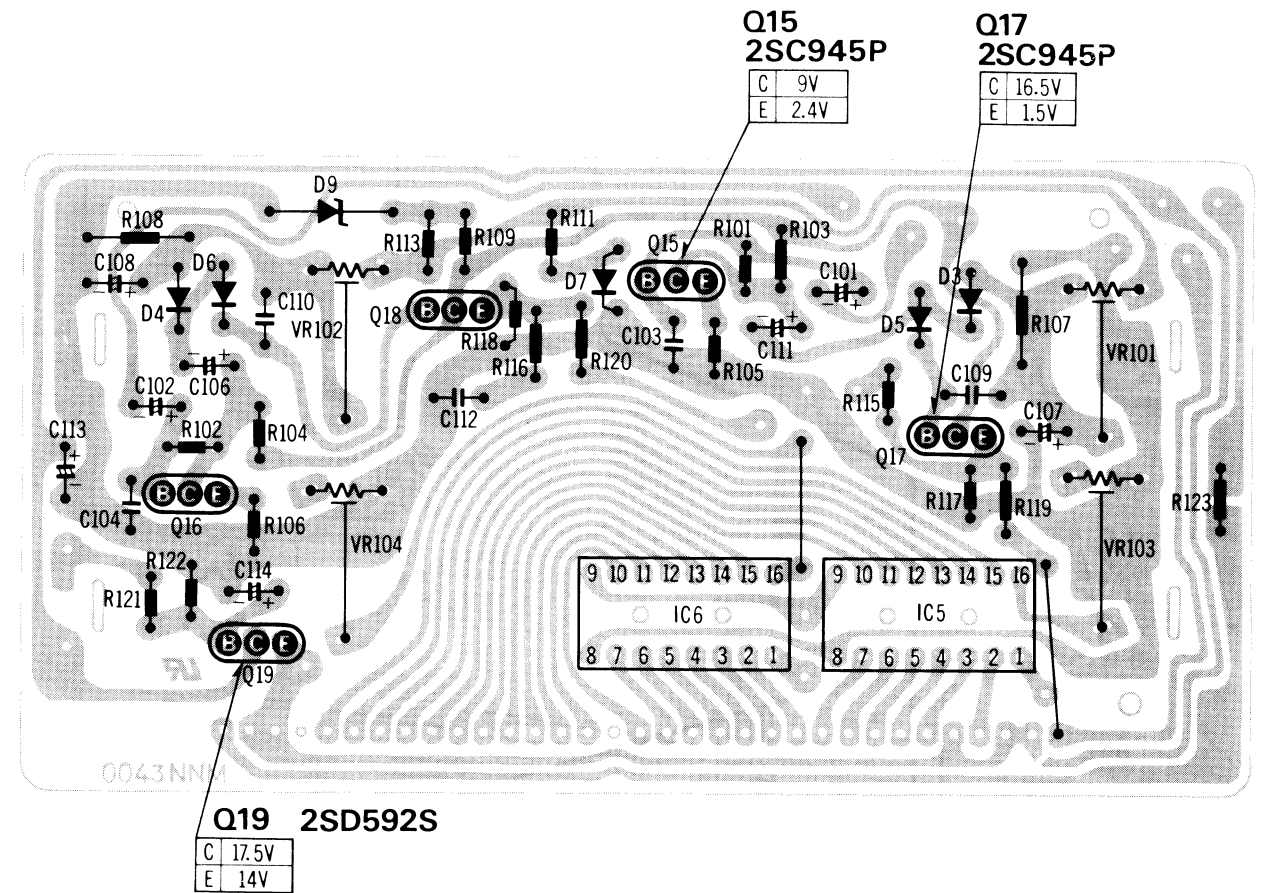
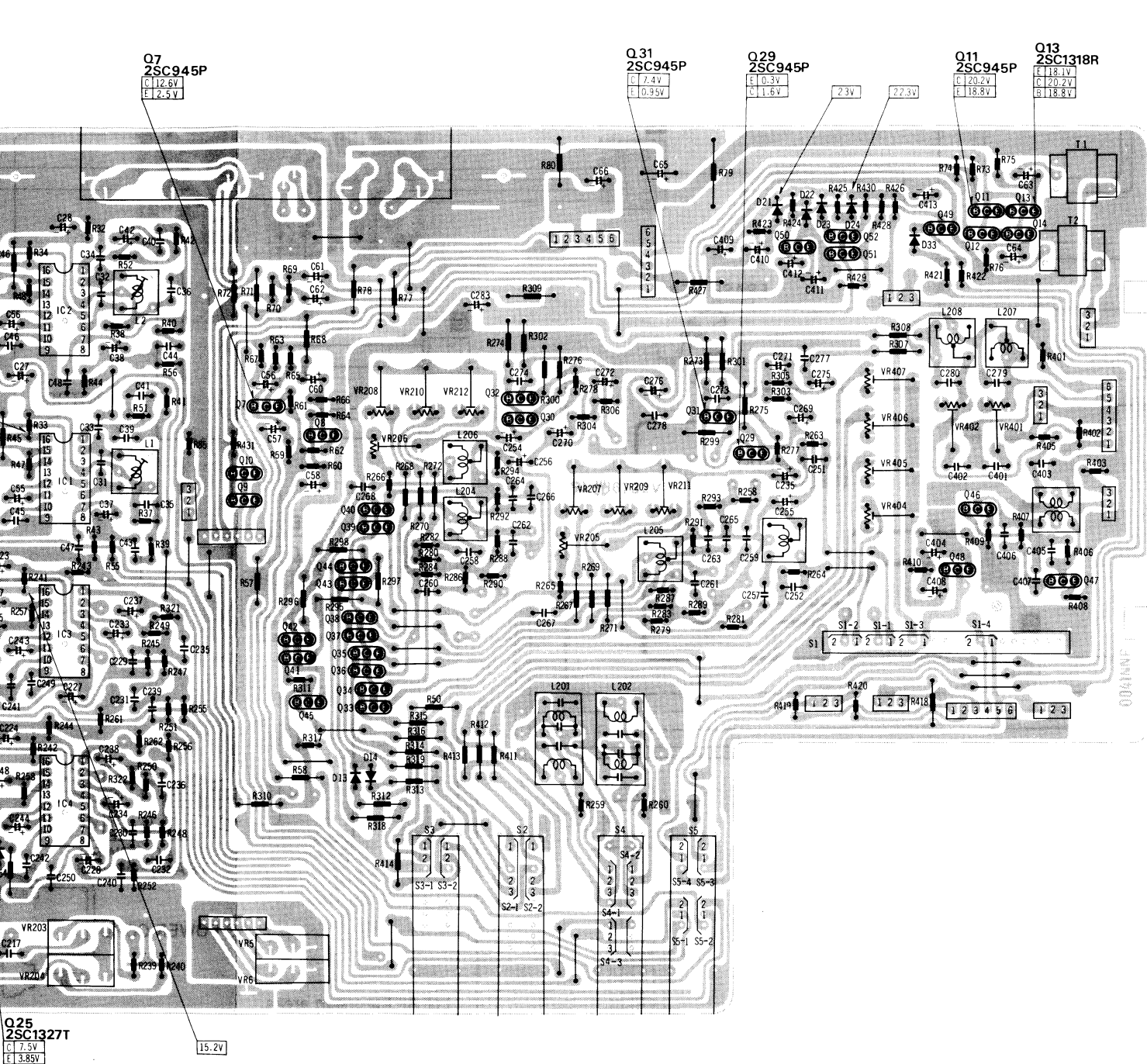
FL MET



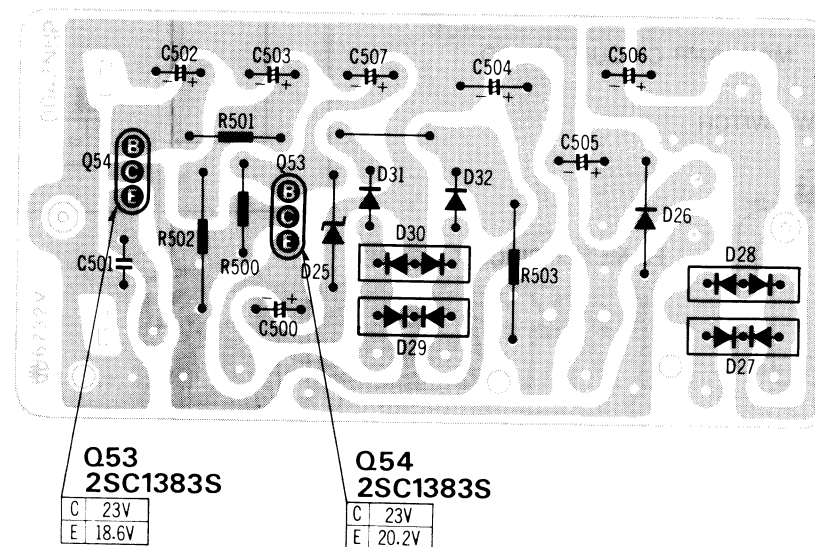
### POWER SUPPLY C



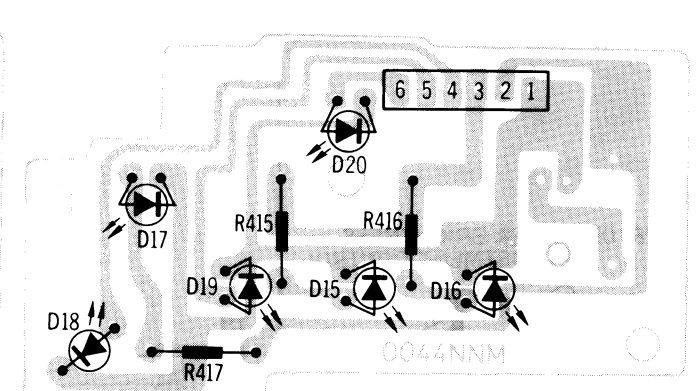
# FL METER CIRCUIT BOARD



## POWER SUPPLY CIRCUIT BOARD

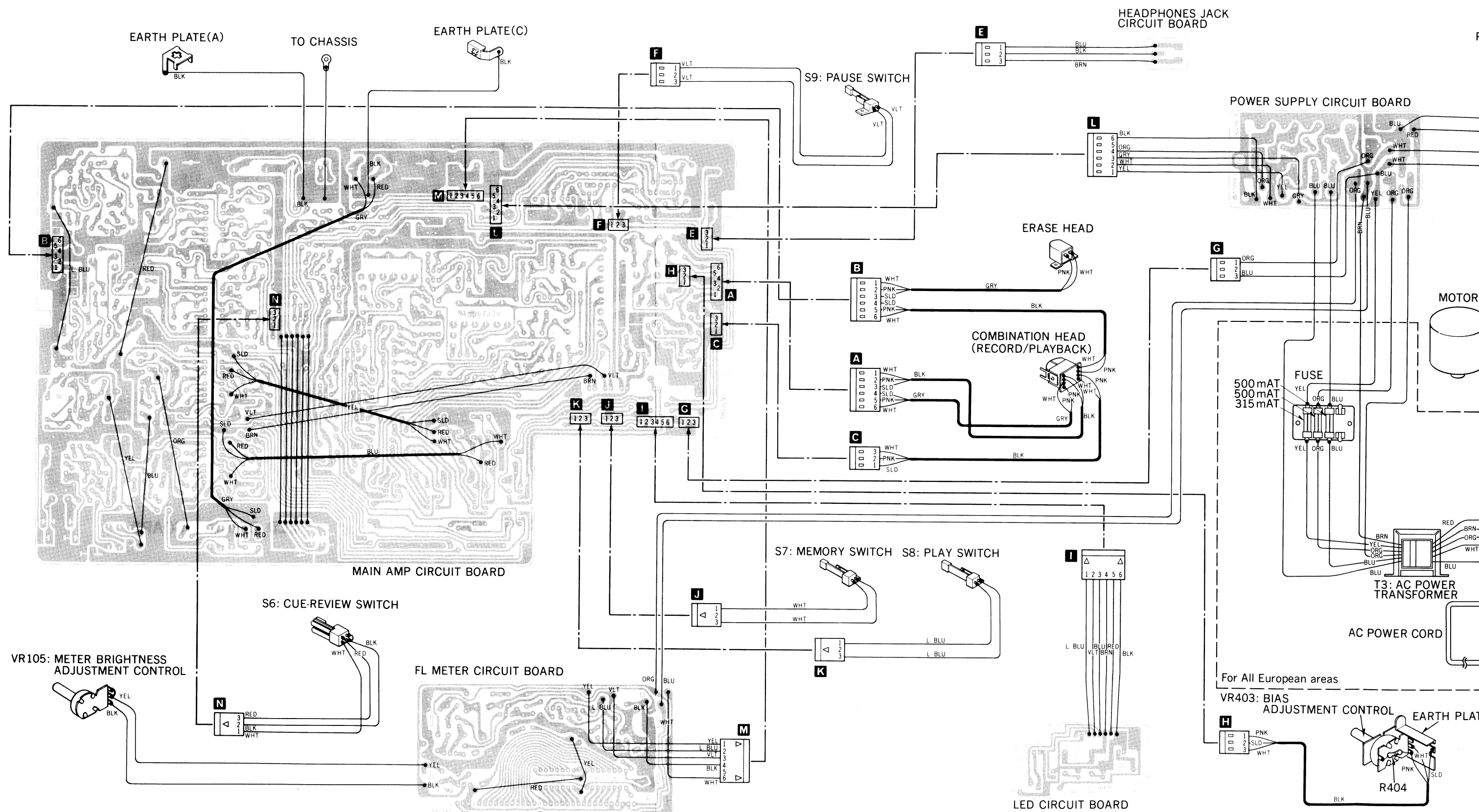


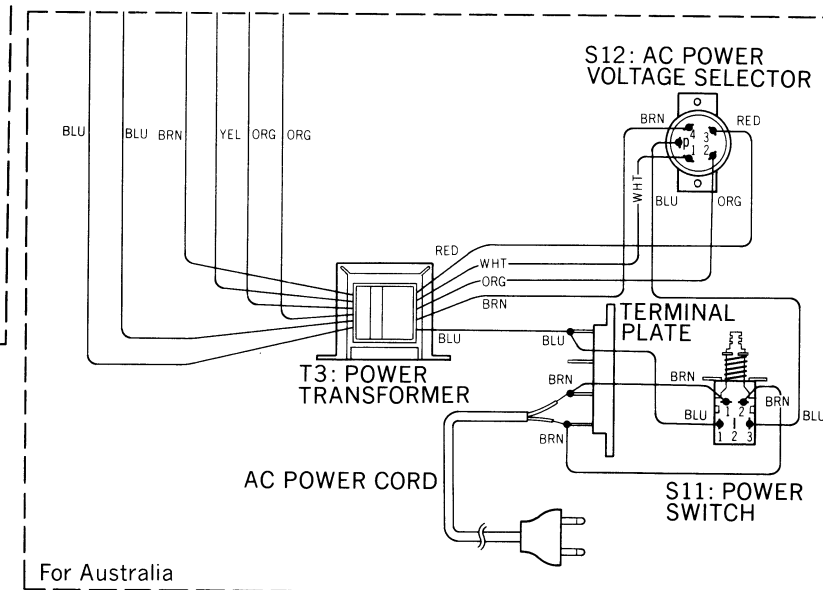
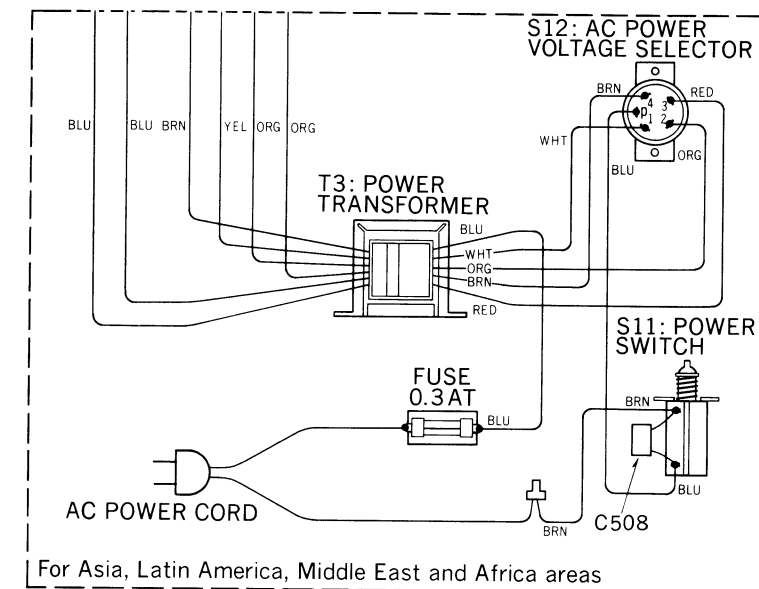
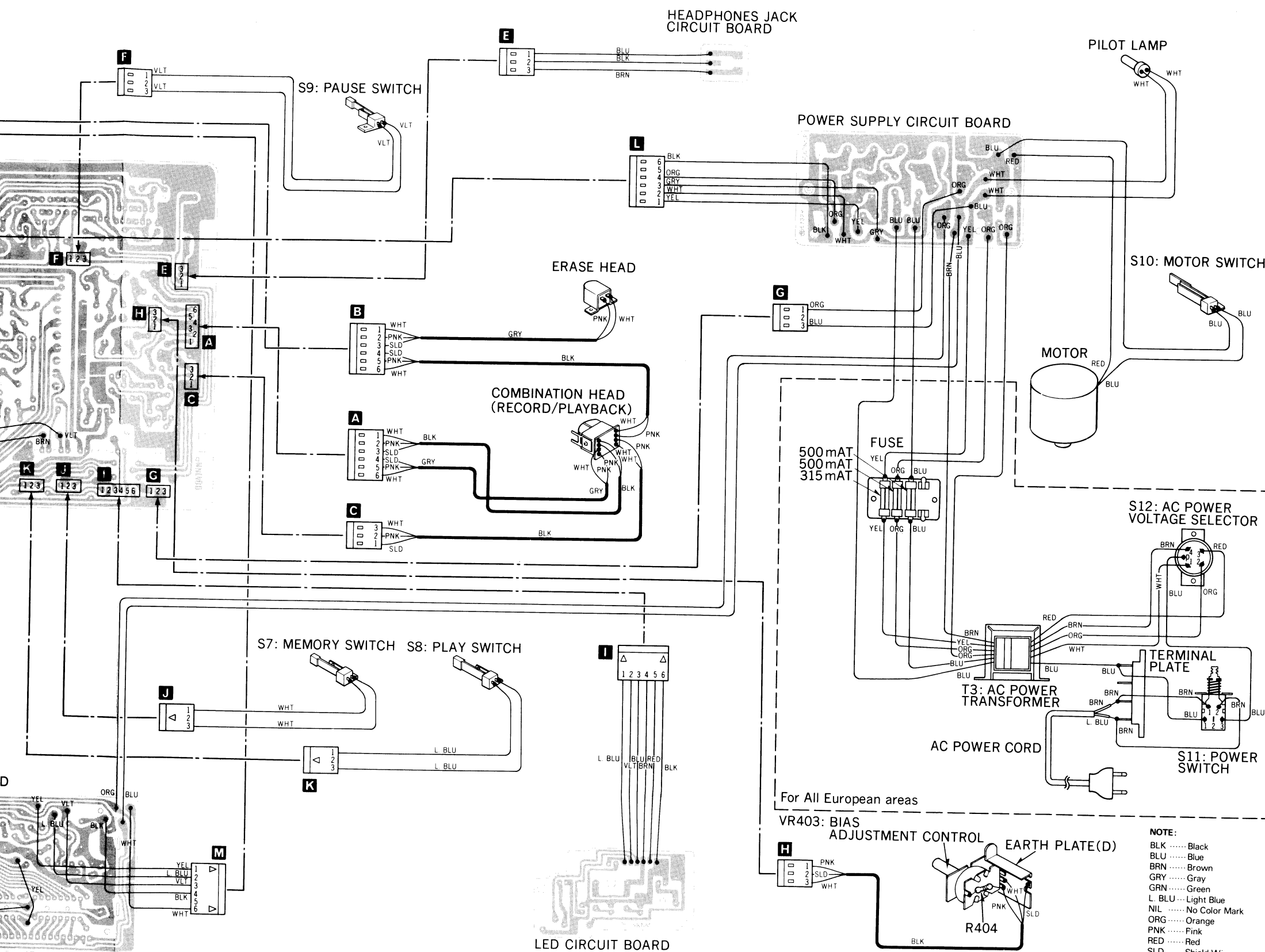
## LED CIRCUIT BOARD



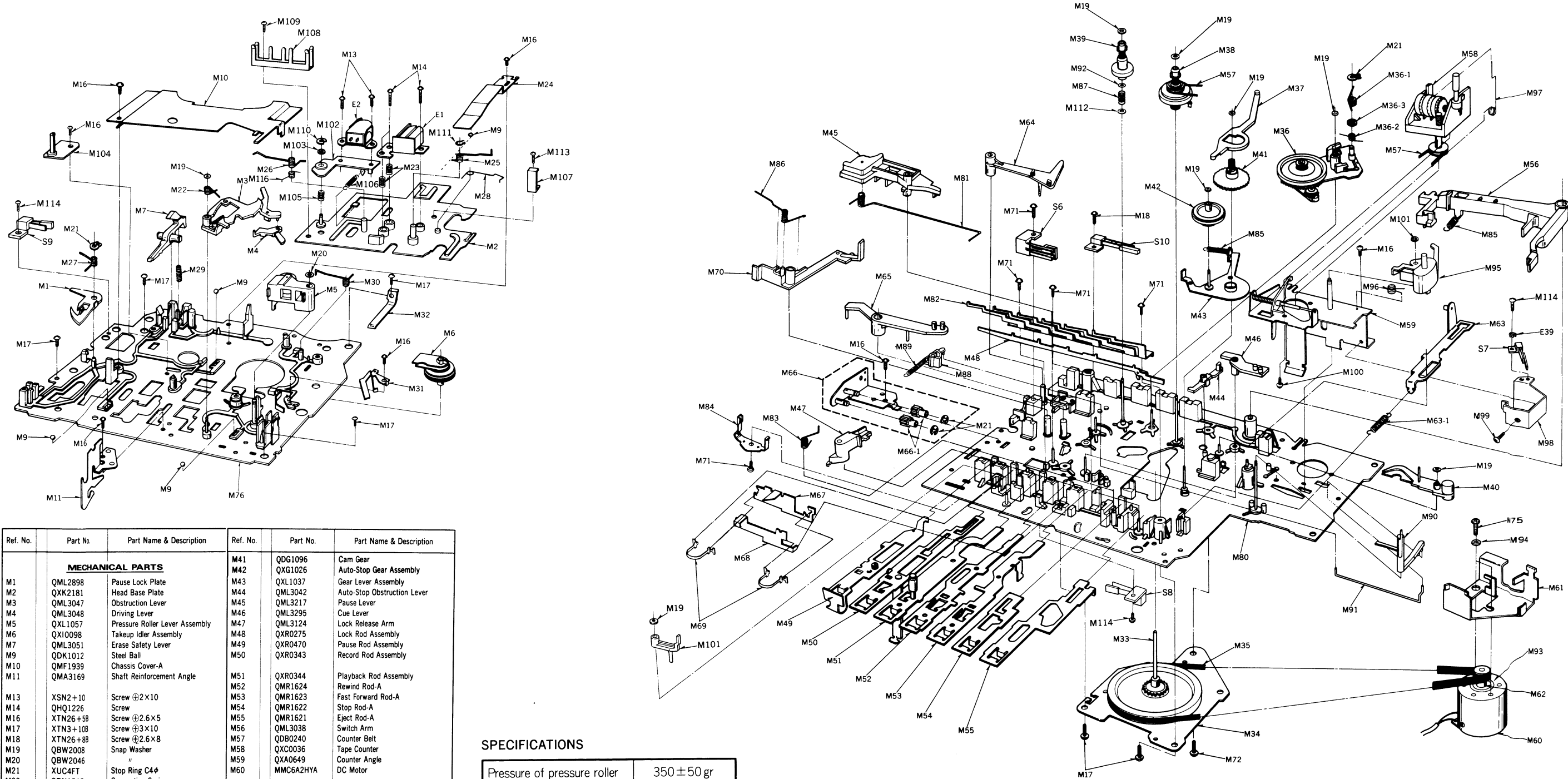


# WIRING CONNECTION DIAGRAM





EXPLODED VIEWS



| Ref. No.                | Part No. | Part Name & Description          | Ref. No. | Part No.  | Part Name & Description          |
|-------------------------|----------|----------------------------------|----------|-----------|----------------------------------|
| <b>MECHANICAL PARTS</b> |          |                                  |          |           |                                  |
| M1                      | QML2898  | Pause Lock Plate                 | M41      | QDG1096   | Cam Gear                         |
| M2                      | QXK2181  | Head Base Plate                  | M42      | QXG1026   | Auto-Stop Gear Assembly          |
| M3                      | QML3047  | Obstruction Lever                | M43      | QXL1037   | Gear Lever Assembly              |
| M4                      | QML3048  | Driving Lever                    | M44      | QML3042   | Auto-Stop Obstruction Lever      |
| M5                      | QXL1057  | Pressure Roller Lever Assembly   | M45      | QML3217   | Pause Lever                      |
| M6                      | QX10098  | Takeup Idler Assembly            | M46      | QML3295   | Cue Lever                        |
| M7                      | QML3051  | Erase Safety Lever               | M47      | QML3124   | Lock Release Arm                 |
| M9                      | QDK1012  | Steel Ball                       | M48      | QXR0275   | Lock Rod Assembly                |
| M10                     | QMF1939  | Chassis Cover-A                  | M49      | QXR0470   | Pause Rod Assembly               |
| M11                     | QMA3169  | Shaft Reinforcement Angle        | M50      | QXR0343   | Record Rod Assembly              |
| M13                     | XSN2+10  | Screw $\varnothing 2 \times 10$  | M51      | QXR0344   | Playback Rod Assembly            |
| M14                     | QHQ1226  | Screw                            | M52      | QMR1624   | Rewind Rod-A                     |
| M16                     | XTN26+58 | Screw $\varnothing 2.6 \times 5$ | M53      | QMR1623   | Fast Forward Rod-A               |
| M17                     | XTN3+108 | Screw $\varnothing 3 \times 10$  | M54      | QMR1622   | Stop Rod-A                       |
| M18                     | XTN26+88 | Screw $\varnothing 2.6 \times 8$ | M55      | QMR1621   | Eject Rod-A                      |
| M19                     | QBW2008  | Snap Washer                      | M56      | QML3038   | Switch Arm                       |
| M20                     | QBW2046  | "                                | M57      | QDB0240   | Counter Belt                     |
| M21                     | XUC4FT   | Stop Ring C4 $\phi$              | M58      | QXC0036   | Tape Counter                     |
| M22                     | QBN1515  | Connection Spring                | M59      | QXA0649   | Counter Angle                    |
| M23                     | QBC1278  | Head Spring                      | M60      | MMC6A2HYA | DC Motor                         |
| M24                     | QBP1773  | Head Base Plate Pressure Spring  | M61      | QMA3414   | Motor Angle                      |
| M25                     | QBN1656  | Pressure Roller Spring           | M62      | QXP0572   | Motor Pulley Assembly            |
| M26                     | QBN1481  | Playback Spring                  | M63      | QXR0345   | Sub Eject Rod Assembly           |
| M27                     | QBN1480  | Pause Lock Spring                | M63-1    | QBT1619   | Idler Spring                     |
| M28                     | QBN1514  | Timer Spring                     | M64      | QML3206   | Muting Arm                       |
| M29                     | QBC1193  | Safety Lever Spring              | M65      | QML3207   | Muting Lever                     |
| M30                     | QBN1513  | Idler Spring                     | M66      | QXG1031   | Damper Gear Assembly             |
| M31                     | QBP1723  | Click Spring                     | M66-1    | QDG1102   | Holder Gear                      |
| M32                     | QBP1777  | Holder Reinforcement Spring      | M67      | QMR1628   | Obstruction Rod-A                |
| M33                     | QXF0131  | Flywheel Assembly                | M68      | QMR1629   | Obstruction Rod-B                |
| M34                     | QXH0239  | Flywheel Retainer Assembly       | M69      | QBP1770   | Obstruction Rod Spring           |
| M35                     | QDB0236  | Capstan Belt                     | M70      | QML3287   | Brake Lever                      |
| M36                     | QXL1136  | Fast Forward Arm Assembly        | M71      | XTN26+68  | Screw $\varnothing 2.6 \times 6$ |
| M36-1                   | QBN1517  | Fast Forward Spring              | M72      | XTN3+25B  | Screw $\varnothing 3 \times 25$  |
| M36-2                   | QBN1559  | Fast Forward Arm Spring          | M75      | XSN26+4   | Screw $\varnothing 2.6 \times 4$ |
| M36-3                   | QMC0080  | Collar                           | M76      | QXK2153   | Upper Base Plate Assembly        |
| M37                     | QML3040  | Cam Lever                        | M80      | QXK2149   | Lower Base Plate Assembly        |
| M38                     | QXD0067  | Takeup Reel Table Assembly       | M81      | QBN1555   | Pause Lever Spring               |
| M39                     | QXD0084  | Supply Reel Table Assembly       | M82      | QBP1664   | Operation Rod Spring             |
| M40                     | QXL1055  | Auto-Stop Lever Assembly         | M83      | QBN1531   | Lock Release Arm Spring          |
|                         |          |                                  | M84      | QBP1662   | Lock Rod Spring                  |
|                         |          |                                  | M85      | QBT1682   | Lock Holding Spring              |

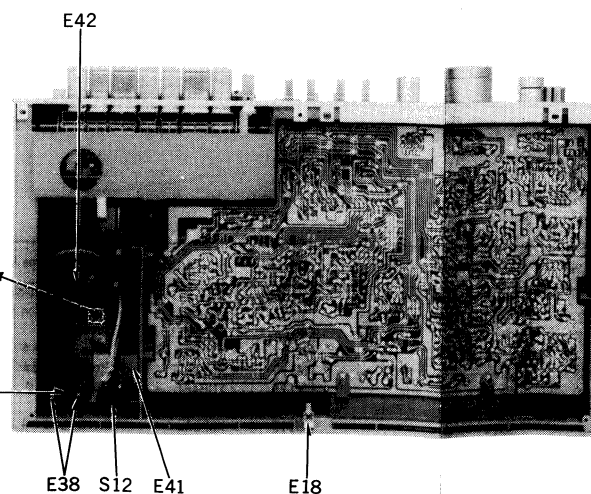
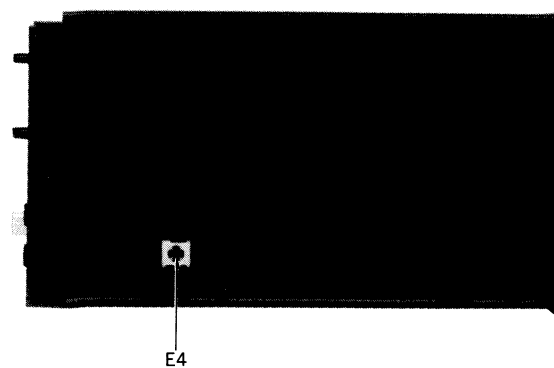
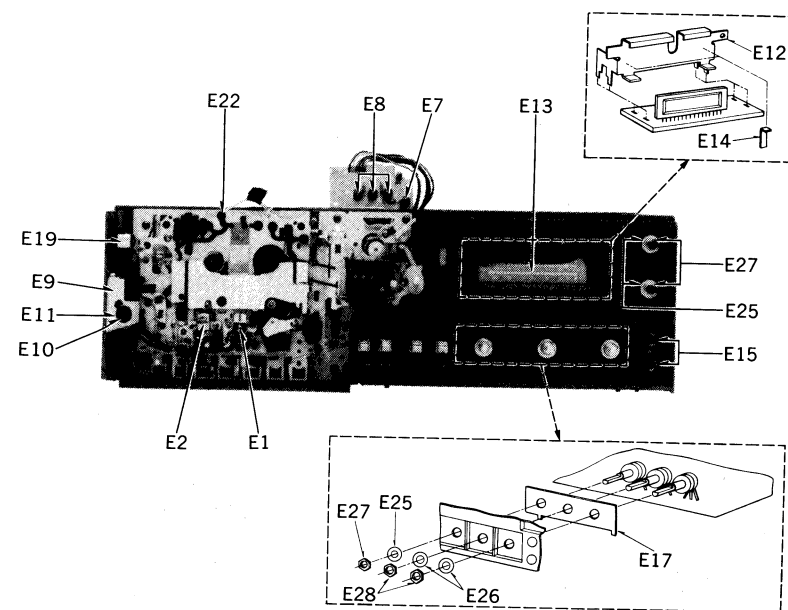
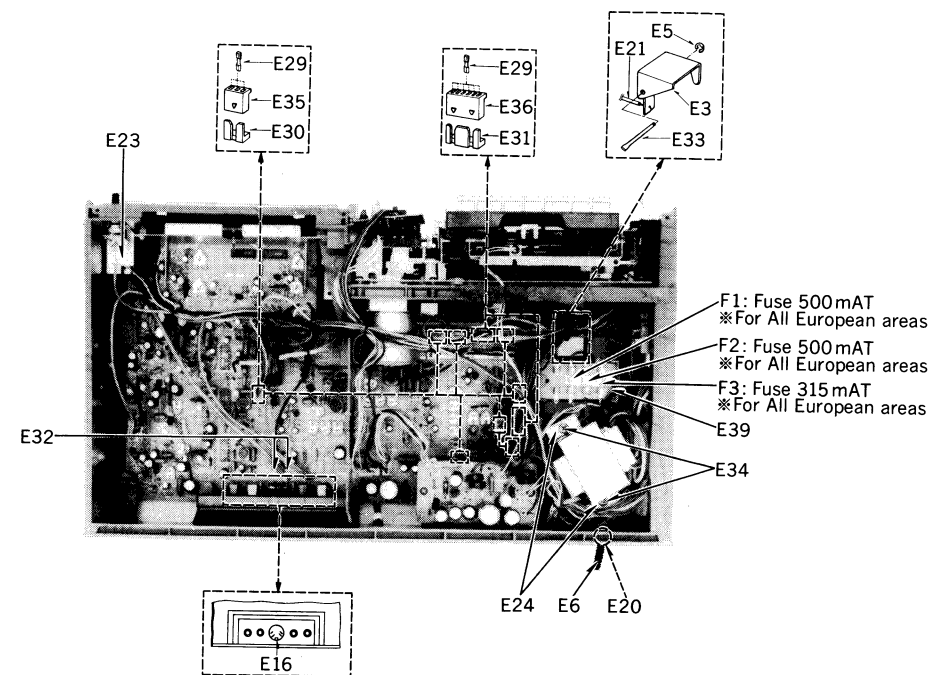
SPECIFICATIONS

|                                                               |                           |
|---------------------------------------------------------------|---------------------------|
| Pressure of pressure roller                                   | 350 $\pm$ 50 gr           |
| Takeup tention<br>(Use cassette torque<br>meter ... QZZSRKCT) | 50 $\pm$ 15 gr-cm         |
| Wow and flutter<br>(Test tape ... QZZCWAT)                    | Less than<br>0.07% (WRMS) |

| Ref. No. | Part No. | Part Name & Description | Ref. No. | Part No. | Part Name & Description          | Ref. No. | Part No. | Part Name & Description          |
|----------|----------|-------------------------|----------|----------|----------------------------------|----------|----------|----------------------------------|
| M86      | QBN1574  | Brake Spring            | M96      | QBN1542  | Selection Lever Spring           | M106     | QBC1343  | Erase Head Holding Plate Spring  |
| M87      | QBC1344  | Back Tension Spring     | M97      | QBN1543  | Reset Reinforcement Spring       | M107     | QMA3806  | Head Protection Angle            |
| M88      | QMD0016  | Rewind Brake Cam        | M98      | QMA3732  | Switch Angle                     | M108     | QTD1273  | Clamper                          |
| M89      | QBT1833  | Brake Cam Spring        | M99      | XTN26+4B | Screw $\varnothing 2.6 \times 4$ | M109     | XTN26+4B | Screw $\varnothing 2.6 \times 4$ |
| M90      | QML3205  | Connection Lever        | M100     | XSN3+55  | Screw $\varnothing 3 \times 5$   | M110     | XUC15FT  | Stop Ring 1.5 $\phi$             |
| M91      | QBS1119  | Connection Wire         | M101     | QML3484  | Playback Switch Arm              | M111     | XUB4FT   | Stop Ring C4 $\phi$              |
| M92      | QBW2018  | Poly Washer             | M102     | QXL1277  | Erase Head Holding Plate         | M112     | QBW2012  | Washer                           |
| M93      | QMF2009  | Motor Sheet             | M103     | XSN2+5   | Screw                            | M113     | XSS26+4  | Screw $\varnothing 2.6 \times 4$ |
| M94      | QMP1441  | Motor Collar            | M104     | QXH0310  | Back Tension Plate               | M114     | XSN2+5   | Screw $\varnothing 2 \times 5$   |
| M95      | QXL1258  | Memory Selection Lever  | M105     | QBT1872  | Erase Head Spring                | M115     | XWG2B    | Washer                           |
|          |          |                         |          |          |                                  | M116     | QBN1699  | Earth Spring                     |



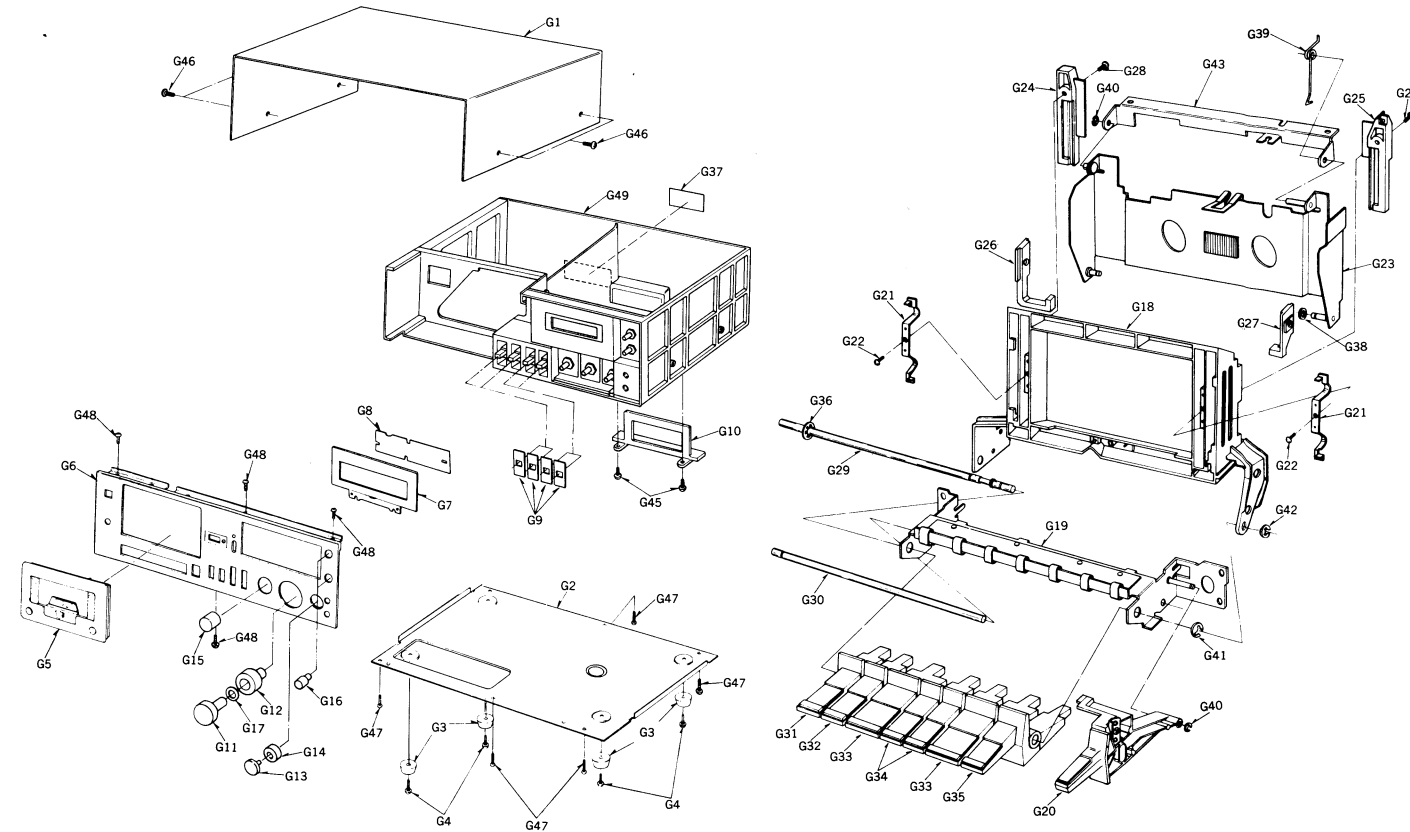
# ELECTRICAL PARTS LOCATION



NOTE: Δ indicates that only parts specified by the manufacturer be used for safety.

| Ref. No.                                                | Part No.    | Part Name & Description                |
|---------------------------------------------------------|-------------|----------------------------------------|
| <b>ELECTRICAL PARTS</b>                                 |             |                                        |
| E1                                                      | WY1403WA    | Combination Head (Record and Playback) |
| E2                                                      | QWY2137Z    | Erase Head                             |
| E3                                                      | QMLM0037    | Record Lever                           |
| E4                                                      | QTSM0027    | Earth Plate-A                          |
| E5                                                      | XUC3FT      | Stop Ring 3φ                           |
| E6                                                      | QFC1204M    | AC Power Cord                          |
| *For All European areas except United Kingdom.          |             |                                        |
| Δ QFC1205M                                              |             |                                        |
| *For United Kingdom.                                    |             |                                        |
| Δ QFC1203M                                              |             |                                        |
| *For Asia, Latin America, Middle East and Africa areas. |             |                                        |
| Δ QFC1208M                                              |             |                                        |
| *For Australia.                                         |             |                                        |
| E7                                                      | QBG1649     | LED Spacer-A                           |
| E8                                                      | QBG1650     | LED Spacer-B                           |
| E9                                                      | QAM0116     | Headphones Jack Angle                  |
| E10                                                     | QJA0249C    | Headphones Jack                        |
| E11                                                     | QNQ1070     | Nut                                    |
| E12                                                     | QAM0117     | Meter Holding Angle                    |
| E13                                                     | QSL5002RF   | Fluorescent Meter                      |
| E14                                                     | QBM1251     | Cushion                                |
| E15                                                     | QJA0257H    | Microphone Jack                        |
| E16                                                     | QEJ5002S    | Jack Board Assembly                    |
| E17                                                     | QTSM0028    | Earth Plate-B                          |
| E18                                                     | QTSM0029    | Earth Plate-C                          |
| E19                                                     | QXB0600     | Push Button Assembly                   |
| "Silver Type"                                           |             |                                        |
| *For All European areas and Australia.                  |             |                                        |
| QXB0600K                                                |             |                                        |
| "Black Type"                                            |             |                                        |
| *For All European areas except United Kingdom.          |             |                                        |
| QXB0558                                                 |             |                                        |
| "Silver Type"                                           |             |                                        |
| *For Asia, Latin America, Middle East and Africa areas. |             |                                        |
| E20                                                     | QBJ1425     | Cord Bushing                           |
| *For All European areas and Australia.                  |             |                                        |
| QTD1129                                                 |             |                                        |
| *For Asia, Latin America, Middle East and Africa areas. |             |                                        |
| E21                                                     | QBSM0003    | Record Wire                            |
| E22                                                     | XAMQ34S600W | Pilot Lamp                             |
| E23                                                     | QTSM0030    | Earth Plate-D                          |
| E24                                                     | QTTM011     | Transformer Holding Plate              |
| E25                                                     | XWS8AW      | Washer                                 |
| E26                                                     | QWQ1133     | " "                                    |
| E27                                                     | XNS8        | Nut                                    |
| E28                                                     | XNS9        | " "                                    |
| E29                                                     | QJT1054     | Contact                                |
| E30                                                     | QJP1921TN   | 3 Pin Post                             |
| E31                                                     | QJP1922TN   | 6 Pin Post                             |
| E32                                                     | QJT0055     | Connector                              |
| E33                                                     | QMS1306     | Fast Forward Lever Shaft               |
| E34                                                     | XTN4+12B    | Screw 4×12                             |
| E35                                                     | QJS1921TN   | 3 Pin Housing                          |
| E36                                                     | QJS1922TN   | 6 Pin Housing                          |
| E37                                                     | QTD1164     | Cord Clamper                           |
| *For All European areas except United Kingdom.          |             |                                        |
| XTN3+16B                                                |             |                                        |
| Screw 3×1.6                                             |             |                                        |
| E38                                                     | QTF1039     | Fuse Holder (4P)                       |
| E39                                                     | QTF1056     | Fuse Holder (1P)                       |
| *For All European areas.                                |             |                                        |
| E40                                                     | QTF1056     | Fuse Holder (1P)                       |
| *For Asia, Latin America, Middle East and Africa areas. |             |                                        |
| E41                                                     | QAM0118     | Switch Angle                           |
| E42                                                     | QJT4017     | Terminal Plate                         |

# CABINET PARTS



| Ref. No.             | Part No.      | Part Name & Description | Ref. No. | Part No.      | Part Name & Description   | Ref. No.                                                | Part No.      | Part Name & Description |
|----------------------|---------------|-------------------------|----------|---------------|---------------------------|---------------------------------------------------------|---------------|-------------------------|
| <b>CABINET PARTS</b> |               |                         |          |               |                           |                                                         |               |                         |
| G1                   | QGC00025      | Case Cover              | G16      | QGT1460       | Volume Knob-F             | G36                                                     | QNQ1080       | Stop Ring               |
|                      | "Silver Type" |                         |          | "Silver Type" |                           | G37                                                     | QGS0100       | Main Name Plate         |
| G2                   | QGC00025K     | "                       | G17      | QYT0529       | "                         | *For All European areas except United Kingdom.          |               |                         |
|                      | "Black Type"  |                         |          | "Black Type"  |                           |                                                         | QGS0102       |                         |
| G3                   | QGC00026      | Bottom Case             | G18      | QBW2066       | Spacer                    | *For United Kingdom.                                    |               |                         |
| G4                   | QKA1050       | Rubber Foot             | G19      | QKF6008       | Cassette Holder           |                                                         | QGS0103       | "                       |
| G5                   | XTN3+10B      | Screw 3x10              | G20      | QXA0637       | Push Button Holding Angle | *For Asia, Latin America, Middle East and Africa areas. |               |                         |
|                      | QYF0369       | Cassette Lid Assembly   |          | QXB0556       | Timer Button Assembly     |                                                         | QGS0102       | "                       |
|                      | "Silver Type" |                         |          | "Silver Type" |                           | *For Australia.                                         |               |                         |
|                      | QYF0399       | "                       |          | QXB0655       | "                         | G38                                                     | QBW2017       | Washer                  |
| G6                   | "Black Type"  |                         | G21      | QBP1771       | Holder Spring             | G39                                                     | QBN1554       | Chassis Cover Spring    |
|                      | QYPM0035      | Front Panel Assembly    | G22      | XTN26+5B      | Screw 2.6x5               | G40                                                     | XUC25FT       | Stop Ring 2.5φ          |
|                      | "Silver Type" |                         | G23      | QXH0271       | Chassis Cover Assembly    | G41                                                     | XUC4FT        | Stop Ring 4φ            |
|                      | QYPM0035K     | "                       | G24      | QKF6010       | Holder Piece-L            | G42                                                     | XUC3FT        | Stop Ring 3φ            |
| G7                   | "Black Type"  |                         | G25      | QKF6009       | Holder Piece-L            | G43                                                     | QMA3186       | Fulcrum Angle           |
|                      | CGKM0120      | Meter Cover-A           | G26      | QMG0050       | Holder Piece-R            | G45                                                     | XTW3+10B      | Screw 3x10              |
|                      | "Silver Type" |                         | G27      | QMG0049       | Holder Slider-R           | G46                                                     | XTN4+10B      | Screw 4x10              |
|                      | QGKM0120K     | "                       | G28      | XTN26+8B      | Screw 2.6x8               | G47                                                     | XTW3+10B      | Screw 3x10              |
| G8                   | "Black Type"  |                         | G29      | QMN2240       | Push Button Shaft-A       | G48                                                     | XTN3+8B       | Screw 3x8               |
|                      | QKJM0029      | Meter Cover-B           | G30      | QMN1861       | Push Button Shaft-B       | G49                                                     |               |                         |
| G9                   | QGK9299       | Switch Mask             | G31      | QG01473       | Push Button (PAUSE)       |                                                         | QYMM0057      | Main Case Assembly      |
| G10                  | QKJM0027      | Jack Board Mask         |          | "Silver Type" |                           | *For All European areas and Australia.                  |               |                         |
|                      | "Silver Type" |                         |          | QG01551       | "                         |                                                         | QYMM0057K     | "                       |
|                      | "Black Type"  |                         | G32      | QG01474       | Push Button (RECORD)      |                                                         | "Black Type"  |                         |
|                      | QKJM0027K     | "                       |          | "Silver Type" |                           | *For All European areas except United Kingdom.          |               |                         |
| G11                  | QYT0488       | Volume Knob-A           |          | QG01552       | "                         |                                                         | QYMM0058      | Main Case Assembly      |
|                      | "Silver Type" |                         | G33      | QG01476       | Push Button (PLAY, STOP)  | *For Asia, Latin America, Middle East and Africa areas. |               |                         |
| G12                  | QYT0526       | "                       |          | "Black Type"  |                           |                                                         | "Silver Type" |                         |
|                      | QYT0489       | Volume Knob-B           |          | QG01554       | "                         | *For Asia, Latin America, Middle East and Africa areas. |               |                         |
|                      | "Silver Type" |                         | G34      | QG01477       | Push Button (FF, REW)     | <b>ACCESSORIES</b>                                      |               |                         |
|                      | QYT0527       | "                       |          | "Black Type"  |                           | A1                                                      | RP023A        | Connectin Cord          |
| G13                  | "Black Type"  |                         |          | "Silver Type" |                           | A2                                                      | QFTC30S011TZ  | Demonstration Tape      |
|                      | QYT0534       | Volume Knob-C           |          | QG01555       | "                         | A3                                                      | QJP0603S      | AC Plug Adaptor         |
|                      | "Silver Type" |                         | G35      | QG01475       | Push Button (EJECT)       | *For Asia, Latin America, Middle East and Africa areas. |               |                         |
|                      | QYT0552       | "                       |          | "Silver Type" |                           | A4                                                      | QQT2574       | Instruction Book        |
| G14                  | "Black Type"  |                         |          | QG01553       | "                         | *For All European areas except United Kingdom.          |               |                         |
|                      | QYT0535       | Volume Knob-D           |          | "Black Type"  |                           |                                                         | QQT2591       | "                       |
|                      | "Silver Type" |                         |          |               |                           | *For United Kingdom and Australia.                      |               |                         |
|                      | QYT0553       | "                       |          |               |                           |                                                         | QQT2592       | "                       |
| G15                  | "Black Type"  |                         |          |               |                           | *For Asia, Latin America, Middle East and Africa areas. |               |                         |
|                      | QYT0536       | Volume Knob-E           |          |               |                           | <b>PACKINGS</b>                                         |               |                         |
|                      | "Silver Type" |                         |          |               |                           | P1                                                      | QPNM0144      | Inside Cushion          |
|                      | QYT0551       | "                       |          |               |                           | P2                                                      | QPAN0036      | Cushion                 |
|                      | "Black Type"  |                         |          |               |                           | P3                                                      | QPAN0037      | Cushion                 |